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THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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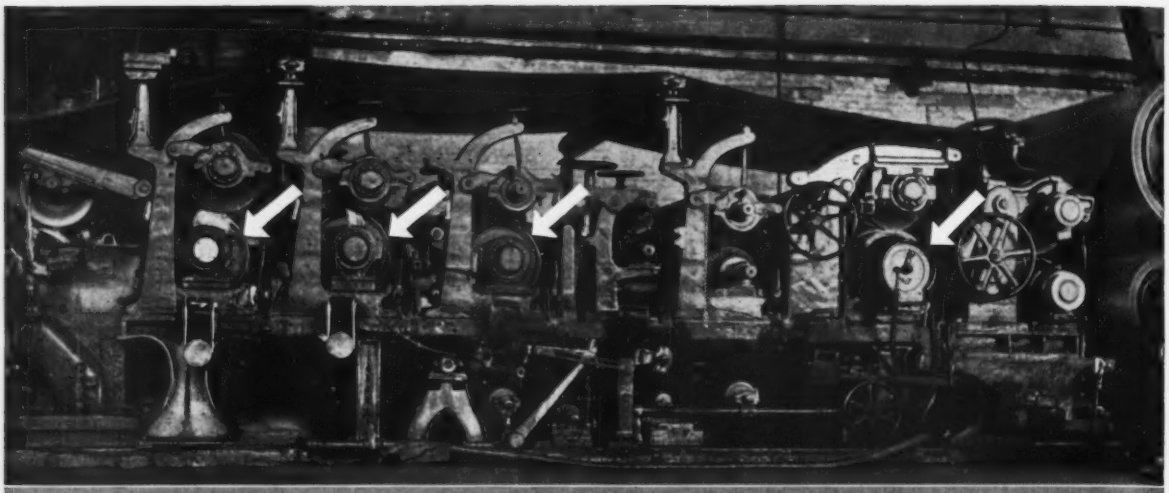

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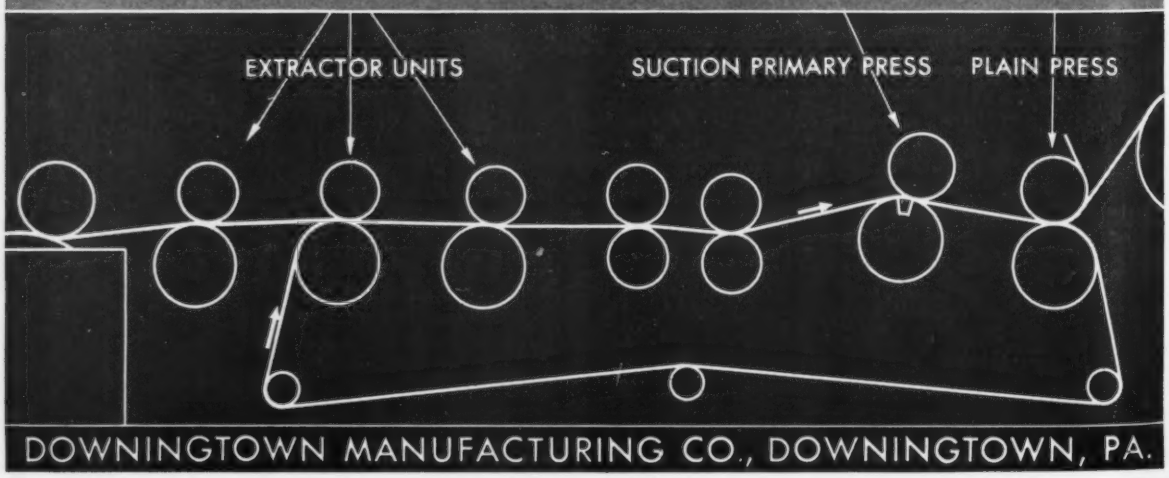

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Paper Output Breaks All Records in 1937

Total Production of All Grades of Paper Increased To 12,600,000 Tons, or 625,000 Tons Higher Than In 1936—Writing Paper Sets Record—Operating Ration of Whole Industry Averaged 85 Per Cent of Capacity.

By M. C. Dobrow, Executive Sec., Writing and Cover Paper Mfrs. Association

In 1937 total paper production in the United States again exceeded all previous records, surpassing the production of 1936 as well as 1929. In 1936 book and writing papers approached, but had not equaled the previous record made in 1929. In the year just ended, these grades established a new high record, exceeding not only their 1936 production, but also the output of 1929.

The paper industry began 1937 on the high crest of a wave, which became topheavy in the Spring, subsided in the Summer, and turned to ebb tide at the close of the year. In the first five months of the year, the industry as a whole operated at more than 90 per cent of capacity, the highest sustained rate in any similar period in the history of the industry. In sharp contrast, operations declined most drastically in the fourth quarter, so that by December the industry was operating at 55 per cent of capacity.

Despite the slackened rate of operations during the Summer months of 1937, followed by so rapid a decline in the closing months of the year, the industry's operating ratio at 85 per cent of capacity was the highest on record with the exception of the operating ratio in 1920, which was 86 per cent.

Early in 1938 demand showed indications of improvements, and operations increased to about four days per week.

Paper Mill Expansion

The United States census placed the capacity of all paper machines in 1936 at 14,458,090 tons. Available capacity in 1937, as indicated in the table at the bottom of this page, was 14,753,000 tons. However, to this must be added some 500,000 tons of annual capacity which was completed before the end of the year but did not get into operation. Of this, 400,000 tons per year should be added to paper board, and 100,000 tons per year to kraft wrapping.

In addition, there are now being built machines with an annual capacity of 566,000 tons, of which 450,000 tons is for paper board, 46,000 for newsprint, 23,000 for book papers, and 47,000 for specialty and miscellaneous grades.

The annual capacity of the United States paper industry may be summarized as follows:

1936 (actual)	14,458,090 tons
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Beginning of 1938	15,253,000 tons
End of 1938	15,809,000 tons

The great expansion was, of course, almost entirely confined to kraft board and paper. This expansion is apparently over, partly on account of the change in business conditions, but more particularly because most of the best economic sites have been taken up. How soon the additional paper making facilities that have been completed and are in the process of completion can be fully employed, only time can tell. The gains in recent years through new uses of paper board both here and abroad have been phenomenal.

As far as printing papers are concerned, even the speculative excess of the early part of last year indicates clearly that there is no demand in sight that

U. S. CAPACITY AND PRODUCTION OF PAPER BY GRADES

Grade	1929 Capacity Tons	1929 Actual Production Tons	1929 Per Cent	1936 Capacity Tons	1936 Actual Production Tons	1936 Per Cent	1937 Capacity Tons	1937 Actual Production Tons	1937 Per Cent
Writing paper	670,000	607,590	91	728,810	602,329	83	731,000	616,000	84
Cover paper	32,000	28,072	88	37,200	25,524	69	37,000	26,800	72
Book paper (uncoated)	1,700,000	1,497,912	88	1,837,680	1,438,046	78	1,890,000	1,525,000	81
Wrapping paper	2,000,000	1,605,783	80	2,180,850	1,879,323	86	2,236,000	1,966,000	88
News print	1,695,080	1,409,169	83	1,007,810	938,287	93	1,010,000	962,700	95
Paperboard	5,696,870	4,451,187	78	6,511,860	5,454,637	84	6,651,000	5,700,000	86
Tissue paper	442,680	387,811	88	640,770	494,721	77	670,000	525,000	78
Building paper	850,000	659,178	78	728,190	549,701	75	728,000	600,000	82
All other paper	617,850	493,533	80	784,920	592,984	76	800,000	678,500	85
Total	13,704,480	11,140,235	81	14,458,090	11,975,552	83	14,753,000	12,600,000	85

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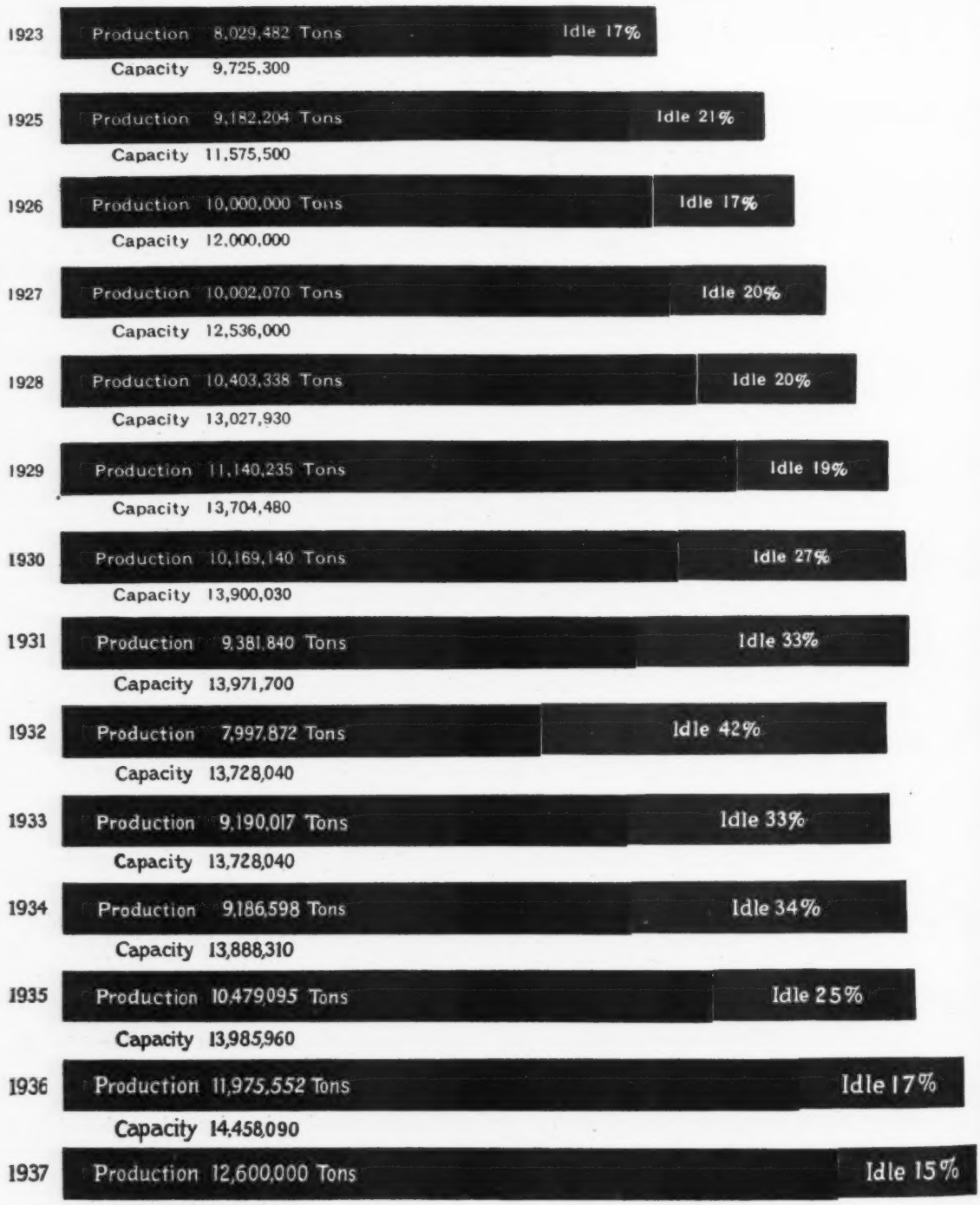


Courtesy of M. C. Dobrow, Executive Secretary, Writing and Cover Paper Mfrs. Association.

CAPACITY AND ACTUAL PRODUCTION OF PAPER MACHINES IN THE UNITED STATES

cannot be adequately supplied by existing production facilities.

Competition for the World's Supply of Bleached Sulphite

A year ago it was evident that the industry was facing a serious situation in the competition from the rayon industry for the available supply of bleached sulphite. During the Spring business peak, scarcity, but not actual shortage, developed and spot prices for bleached sulphite exceeded $90 per ton, from which level it dropped precipitately as the business recession got under way in the fourth quarter. The domestic contract price for the first quarter was $54, for the second quarter $58, for the third quarter $65, and for the fourth quarter $70. The price for the first quarter of 1938 was reduced to $60 per ton or $10 per ton higher than in 1936.

In 1935 total world production of rayon, staple fibre and cellophane was approximately 1,150,000,000 pounds. In 1936 this had increased to 1,405,000,000 pounds. Another new high record was established in 1937, when the world production for these dissolving pulp products was 1,850,000,000 pounds. It is evident from these figures that the previous estimate that these industries are consuming about 1,000,000 tons of bleached sulphite per year is approximately correct. This represents some 30 per cent of the present world production of bleached sulphite.

There is considerable basis for the belief that the current recession in world production of rayon is but temporary, and that these gains will be resumed as they continued throughout the 1930-33 depression.

World production of staple fiber (included in the foregoing figure) was 299,000,000 pounds in 1936, and increased to 600,000,000 pounds in 1937. The continued gain of these industries and the possibilities for use of bleached sulphite in the plastic industries indicate a continued growing consumption of bleached sulphite or dissolving pulps by sources outside the paper industry.

Increasing Costs of Production

Despite the business recession and the decline in prices of many basic commodities, the actual cost of production in paper mills has continued to rise. Hourly wage rates are now 16 per cent higher than a year ago. The pending increase in freight rates, considering the in-and-out traffic of paper mills, will increase the cost of the finished product $3 to $5 a ton.

Writing Paper Achieves New Production Record

Writing paper production for 1937 was estimated at 616,000 tons. This production, 8,410 tons higher than in 1929, was just enough to achieve a new production high. The industry operated at 84 per cent of capacity, which compares with 83 per cent in 1936 and 71 per cent in 1935.

No additional writing paper machines have been reported for 1938, but the industry is constantly faced in depressed times with the possibilities of the shifting of machine capacity from other fields.

Measures of Fine Paper Consumption

The writing paper industry began the first quarter of 1937 with a gain of 25 per cent in tonnage shipped over the corresponding period of 1936. Increases were less significant in the second and third quarters.

OPERATING RATIOS

Year	Capacity Tons	Production Tons	Per Cent
1920	8,540,000	7,334,600	86
1921	8,614,200	5,431,265	63
1923	9,725,300	8,029,482	83
1925	11,575,500	9,182,204	79
1926	12,000,000	10,000,000	83
1927	12,536,000	10,002,070	80
1928	13,027,930	10,403,338	80
1929	13,704,480	11,140,235	81
1930	13,900,030	10,169,140	73
1931	13,971,700	9,381,840	67
1932	13,728,040	7,997,872	58
1933	13,728,040	9,190,017	67
1934	13,888,310	9,186,598	66
1935	13,985,960	10,479,095	75
1936	14,458,090	11,975,552	83
1937	14,753,000	12,600,060	85
1938	15,809,000		

In the fourth quarter the decrease from the corresponding period of 1936 was so marked that at the close of the year, total shipments were practically the same as last year in tons, but 7 per cent higher in dollars.

The physical volume of all production and trade in the United States, however, was 5 per cent higher than the previous year. This indicated that although there was tremendous anticipatory buying of paper in the early part of the year, the sharp drop in the closing months of the year has eliminated all excess inventories in the hands of dealers and consumers. In fact, merchants' dollar sales for 1937 were 16 per cent higher than in 1936 which, because of the average increase of price, indicated that in pounds their sales were 8 per cent or 9 per cent higher than the previous year.

The printing industry also made an important gain over the previous year. The index of productive hours published by the U.T.A. indicated a gain of 12 per cent in 1937 over 1936.

All these factors seem to indicate a substantial liquidation of stocks in the field which must soon be replenished, at least in direct proportion to the general volume of production and trade. This has already been indicated in the improved demand for fine papers which became evident in January of this year.

To Erect Pulp Mill in Newfoundland

The Newfoundland Commission of Government announces that a statement will be made shortly concerning a proposed agreement with Bowater-Lloyds Paper Company of England for establishment of a sulphite mill in the Gander Lake district.

Sir Wilfrid Woods, Commissioner of Public Utilities, had presented an outline of the agreement on his return from a prolonged visit to London, where he conferred with Bowater officials, the announcement said. The report was now being studied by the Government.

Tentative plans call for the establishment of a $6,000,000 mill in a heavily-timbered section of Newfoundland, with a daily capacity of 226 tons. The company would build the mill in return for timber and tariff concessions from the Government.

Waterfalls Mills to Spend $100,000

The Waterfalls Paper Mills, Mechanic Falls, Maine, will spend approximately $100,000 on improvements during 1938. New "save-alls" and white water systems are being installed on all of the machines, as is a system of moisture control and additional drying equipment. Changes in the finishing room will also be undertaken.

North American Newsprint Output Last Year Established New High Record

By Royal S. Kellogg, Secretary, Newsprint Service Bureau

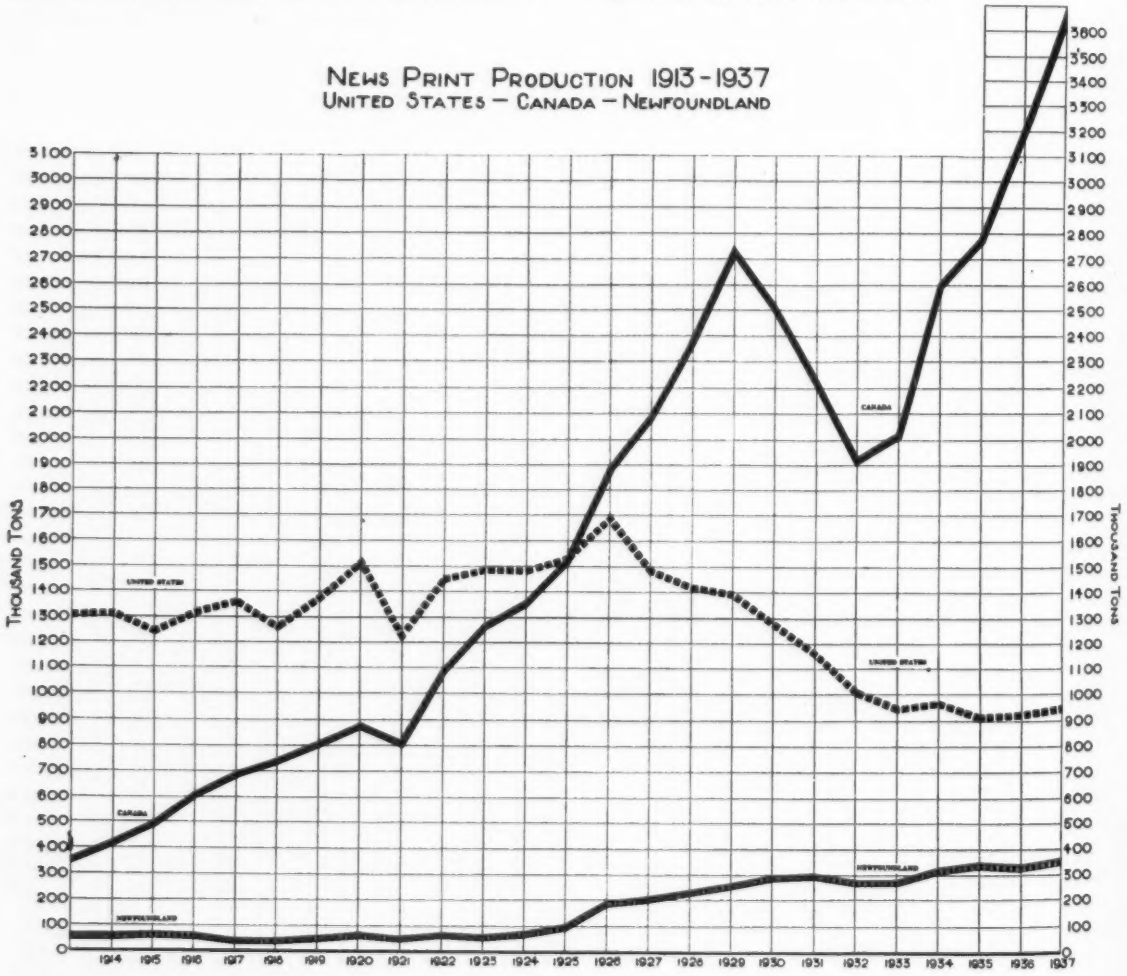
North American news print production in 1937 established a new high figure of 4,944,000 tons. This was half a million tons more than in 1936, and 549,000 tons more than in the previous record year of 1929. The 1937 output of news print in North America was probably also 56 per cent of a world output in the neighborhood of 8,900,000 tons, the latter figure being only a rough estimate at this time. Nearly all the industry ran close to capacity with the facilities available during 1937, and operating ratios were undoubtedly higher than in any year since 1926.

The 1937 North American news print production total was made up of 3,645,309 tons in Canada, 946,000 tons in the United States and 353,000 tons in Newfoundland, or in the ratios of 74 per cent in Canada, 19 per cent in the United States, and 7 per cent in Newfoundland. Canadian production increased 465,595 tons, or 14.3 per cent more than in 1936, United States production gained 25,000 tons or 2.6 per cent over the previous year, and Newfoundland production was 25,000 tons or 7½ per cent more than in 1936. The Canadian figure, of course, was far and away greater than ever before attained. Production in the United States was in practically the same volume as in 1933, while the Newfoundland output was 17,000 tons more than the previous mark established in 1935.

The continental output in 1937 went so far ahead of 1929 that the latter year will no longer serve as the outstanding reference mark.

Exports Gain 15 Per Cent in Year

Exports of news print paper from Canada during 1937 were 3,455,000 tons, according to official Ottawa statistics. This was a gain of 15 per cent over exports of 2,993,000 tons in 1936.



Courtesy News Print Service Bureau.

Shipments to the United States from Canada last year were 2,899,000 tons or exactly 500,000 tons more than in 1936, a gain of 21 per cent.

Overseas shipments of Canadian news print in 1937 amounted to 556,000 tons, a decrease of 38,000 tons or 6 per cent from the record-making figure of 594,000 tons reached in 1936. With the exception of 1936, however, Canadian overseas exports of news print last year were the largest of any year on record.

Canadian news print had practically world-wide distribution in 1937. By far the largest overseas destination was the United Kingdom, with Australia a strong second and Argentina third. Shipments to the United Kingdom in 1937 were much larger than in 1936. This was also the case with shipments to South Africa, Argentina, Mexico and Cuba. On the other hand, there was less movement of Canadian news print to Australia, New Zealand, Chile, Japan and China in 1937 than in 1936.

Exports of news print from the United States, while somewhat more than in 1936, were only some 17,000 tons in 1937, and of little moment in the international distribution of that commodity. The principal external users of United States news print were in Cuba, Central and South America, China and the Philippines.

Imports Increased 21 Per Cent in 1937

Imports of news print paper into the United States from all sources totaled 3,317,000 tons in 1937, an increase of 565,000 tons or 21 per cent over the 1936 importations.

The news print paper imported into the United States last year came to the extent of 88 per cent from Canada, 9 per cent from Europe, and 3 per cent from Newfoundland. Canada's news print shipments to the United States were 80 per cent of her production. The 294,000 tons of news print which came across the Atlantic Ocean to the United States in 1937 was a much larger quantity than ever before received from overseas. Nearly 102,000 tons arrived from Sweden and almost 155,000 tons from Finland. More than 24,000 tons came from Norway and 13,000 tons from Germany. These were new high figures for news print receipts from Sweden and Finland, but a much smaller quantity from Germany than the peak of 52,000 tons in 1923. The largest quantity of news print ever to come into this country from Norway was also in 1923 with nearly 34,000 tons. On the other hand, importations of news print from Finland have more than doubled since 1935.

Consumption and Stocks on Hand

By no means was all the news print paper shipped into the United States in 1937 used in that year. There was a heavy accumulation of stocks in the hands of publishers due to a smaller consumption in the latter half of the year than anticipated, and also to the building up of supplies against a price increase in 1938. Nevertheless, the total use of news print paper in the United States last year was around 3,830,000 tons. This was 180,000 tons or 5 per cent more than in 1936 and 50,000 tons more than in the previous peak year of 1929. On the basis of population the per capita use of news print in the United States in 1937 was slightly more than 59 pounds, whereas the per capita consumption in 1929 was a little more than 62 pounds. On the other hand, the 59 pounds per capita used last year was a most substantial comeback from the slightly less than 43 pounds used in 1933.

Newspaper Circulation Grows

The most cheerful item to both news print paper manufacturers and newspaper publishers is the still growing volume of newspaper circulation. According to the compilation by *Editor & Publisher* the total circulation of English language daily and Sunday newspapers in the United States for the twelve months ending September 30, 1937, was 72,376,000 copies. This was a gain of 3 per cent over the corresponding period a year earlier and of 22 per cent from the low point of the depression. In fact, newspaper circulations in the United States are now 9 per cent above the level reached in 1929-30. Canadian English language daily and Sunday newspapers are also doing well with 19 per cent more circulation than in 1933 and 5 per cent more than in 1929.

It is this large and sustained newspaper circulation which furnishes the substantial foundation for news print consumption, despite disappointing advertising volume at the present time.

Finnish Wood Pulp Production

Finnish output of wood pulp for 1937 has been reliably estimated at 1,500,000 metric tons and paper and board at 630,000 metric tons, including 400,000 tons of newsprint and 100,000 tons of paperboard, according to a report from the office of the American Consul General. Production of wood pulp has been divided as follows: sulphite pulp 800,000 tons, sulphate pulp 400,000 tons, and mechanical pulp 300,000 metric tons.

During the past two years 3 large new sulphate pulp mills have been constructed in Finland adding 280,000 tons productive capacity to the industry.

New construction contemplated at the present time includes a newsprint machine to be added to the Anjala mill, which will be ready for production by January 1939. The first machine ordered by this company, with a manufacturing capacity of about 39,000 tons annually, will be ready for production in January of the coming year. The second machine mentioned above will double the mill's capacity. The annual output of the Lohken Celluloosa will be increased to 20,000 tons of kraft pulp per year. The company is also planning the purchase and installation of a machine which will turn out between 6,000 and 7,000 metric tons of kraft paper per year.

Russia's Paper Production

Unofficial reports to the Department of Commerce state that the production capacity of all paper mills in 1936 in Russia was 900,000 tons. Apparently this is the latest information available.

Newly opened paper mills in operation as of January 1, 1937, were to account for 16 percent, or approximately 153,000 tons, of the total plant production for last year which was 955,350 tons. Consequently, the production capacity of all paper mills in Russia may be estimated at 1,053,000 tons. Twenty-four percent of the latter figure, or 250,700 tons, is therefore the planned production capacity of news print mills in the Soviet Republic.

Book Paper Industry Ends Year with Gains As Production Paralleled Orders

Specially Written for the Annual Review Number of The PAPER TRADE JOURNAL

The twelve months' 1937 production of book paper, both coated and uncoated, was 8.0 per cent greater than in 1936. However, to obtain a clear picture of business in the book paper industry in 1937 it is necessary to consider separately the early part of the year and the latter part of the year.

There are certain seasonal variations in the industry which tend to occur regardless of whether business is good or bad or is on an upward or downward trend. For instance, there are usually definite seasonal peaks in orders in March and September each year and corresponding seasonal low points in July and October.

However, in October, 1936, orders increased instead of falling off and, except for a slight drop in January, continued to increase up to the peak in March, which was 13 per cent above March, 1936.

Seasonal Decline in Spring

Ordinarily orders fall off in April and May each year, and also in June and July. In June and July, however, the rate of decline was considerably less than in April and May. In April and May of 1937, orders fell off at the usual seasonal rate, but instead of the rate of decline decreasing in June and July, orders continued to drop at the same rate as before. From July to September the net increase was about the same as the usual seasonal rise during this period, but from September to the end of the year a steady decline in orders took place, December orders being as low as at any point since the NRA period.

Production in 1937 Paralleled Orders

Production in the book paper industry during 1937 paralleled orders. The early year peak was not as high relatively as for orders nor the seasonal drop from March to July as great as for orders. However, the drop between August and December was around 28 per cent. It is interesting to note that this compares with a drop of 30 per cent in the *Annalist* index of productive activity.

During 1936 book paper prices were some 5 per cent lower than the U.S. Bureau of Labor Statistics index of wholesale commodity prices (1926=0) and 22 per cent lower than the average price of book paper in 1929. Book paper prices, however, began an upward trend at the close of 1936 which continued into 1937, the average price for book paper in 1937 being about 85 per cent of the 1929 price.

The Inventory Situation

In common with most industries, inventories of book paper increased during the past year but a reduction of these inventories has taken place in the last few months, so that the inventory condition is more normal.

As stated in the first paragraph, business for the entire year was better than in 1936, although the trends were reversed, business being on an upswing the latter part of 1936 and on a downward trend the latter part of 1937.

German Pulp Production Increases

The German Four Year Plan, which is manifesting itself in almost every branch of the national industry is also being applied to pulp and paper production, reports received by the Department of Commerce state. Germany's chemical pulp production has been increasing by leaps and bounds; from scarcely one million metric tons in 1932 it rose to approximately 1,500,000 metric tons in 1937. The Four Year Plan provides for a complete shift in raw material supplies. The costly imports of foreign spruce woods are being replaced on an increasing scale by domestic beech and fir and also by straw. The domestic long fiber fir is to be reserved for paper production and the short fiber to production of chemical pulp for the rayon industry. It is hoped that this re-distribution of raw material supplies accompanied by a drastic curtailment in the use of beech wood for heating purposes will result in a substantial increase in domestic supplies for the paper industry.

Brazil's Pulp Consumption

It is estimated that of Brazil's annual consumption of pulp, which in 1936 amounted to 84,460 metric tons, 85 per cent was unbleached sulphite pulp for use in the manufacture of wrapping and other low-grade papers, while the remaining 15 per cent was bleached sulphite pulp which was consumed by the few mills engaged in the production of writing and certain types of printing paper. Brazil's production of paper pulp is so small as to be of little importance from a competitive standpoint. A small volume of mechanical pulp is produced, but, the great bulk of the country's requirements are supplied through importation.

There are no paper mills operating in Brazil which possess the equipment necessary for bleaching pulp, which fact restricts imports exclusively to prepared pulp, either bleached or unbleached.

Australia Puts Wall Board on Free List

The Australian Department of Trade and Customs has issued a further list of items for which permits to import from the United States will be freely granted, according to a report to the Department of Commerce from the American Trade Commissioner at Sydney. Among the more important items on the list are insulating boards and wall boards which come under the classification "wall and ceiling boards and decorations unclassifiable under tariff item 425".

Paperboard Division Leading Paper Industry With All Time Production Record

By Grafton Whiting, National Paperboard Association

The size and importance of the paper industry has advanced in recent years to a position of seventh among the major industries in the United States.

The total output in 1936 was nearly 12,000,000 tons of all grades and kinds of paper, of which the output of paperboard mills was by far the largest of any division. The principal divisions of the industry, and the per cent of each to the total are listed below:

Division	Per cent
Paperboard	43
Wrapping	16
Book Paper	12
News Print	8
Writing	5
Building	4
Others	12
Total	100%

The year 1937 established a new all-time high for paperboard production and surpassed the previous high of 1936 by nearly 5 per cent. During the past eleven years there have been seven years of gains, each averaging 11.3 per cent and four years of losses, averaging 7 per cent, with a net growth averaging 4.9 per cent, or about 210,000 tons annually.

Production of Paperboard

Paperboard, as the term implies, is a product made on a paper machine in the same manner as paper, but of greater thickness to procure a board suitable for making cartons and shipping containers. It is 12 points (12/1000 of an inch) or more in thickness and formed into a board appropriate for a protective covering that will withstand hard usage.

The paperboard industry is composed of mills operating more than 370 multicylinder and fourdrinier machines located in all sections of the United States. It excludes cetrain grades, such as cardboard, cover board, builder's board and leather board which are not fabricated into boxes, but includes corrugating materials (.009 of an inch in thickness) and some of the lighter weights made for the corrugated shipping container industry.

The principal grades and their relative position in the industry are shown in Chart I, which gives a general description of the several grades. The purposes for which they are used follows:

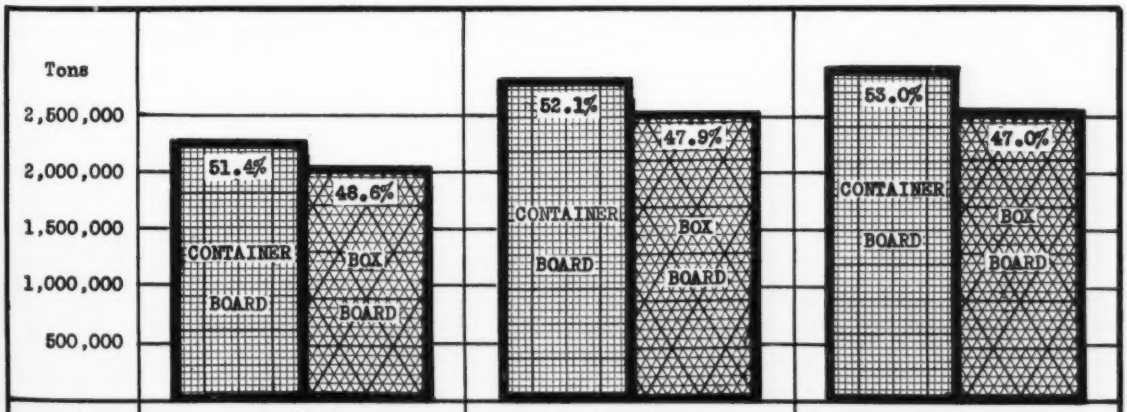
Container grades are used by fabricators of corrugated and solid fibre shipping containers and represent more than one-half of the demand upon the paperboard industry.

Boxboard grades are divided into three main classes, briefly described below:

Folding boxboard, which is used in the manufacture of folding cartons, for the packaging of small units.

Set-up boxboard, which is fabricated into rigid paperboard boxes—most frequently covered with fancy designed paper.

Other boards, which include specialties of all kinds that can be made to advantage on a paperboard machine.



YEAR	1935	1936	1937
CONTAINER	51.4%	52.1%	53.0%
Liners	32.0	32.4	33.1
Straw, Etc.	13.2	13.4	13.5
Chip	6.2	6.3	6.4
BOXBOARD	48.6%	47.9%	47.0%
Folding	23.0	22.7	22.4
Set-up	12.3	11.7	10.7
Other	13.3	13.5	13.9

The percentages for 1937 are estimated.

CHART I

The increase in tonnage of container grades has been a major factor in the growth of the industry during the past three years. This growth is attributed not only to improvement in general business activity, but also to expansion into new fields where paperboard shipping containers have proven both safe and economical.

Improvement in the volume of folding box grades has been gained although the proportion of the total has declined slightly percentage-wise. This division is affected less by seasonal variation and maintains a slow but steady growth. The set-up box division shows a falling percentage as compared with the other grades, but the total tonnage in 1937 exceeded that of 1935.

Other grades of board represent the many special and novel uses of paperboard. The growth in this field is of particular interest since tonnage so placed is not confined to the more competitive markets and tends to relieve the pressure on the regular grades.

Although some mills devote their output to one branch of the industry, others serve many different fields, and such diversification tends toward a more stabilized demand.

Principal Raw Materials

The principal raw materials entering into the manufacture of paperboard are waste papers, collected in the cities and towns; prime pulp produced in this country or imported, and straw purchased from farmers in the fall. Coal for developing power and heat is another large item which enters into the conversion costs.

Waste Paperstock

It is estimated that waste papers consumed by paperboard mills exceeded 4,000,000 tons in 1937 with a value of over $44,000,000. Of this 41 per cent is mixed paper, 23 per cent newspaper, and 36 per cent other grades. The average prices for the year in Chicago were: Mixed $9.50; News $11.00; in New York: Mixed $8.00; News $9.50, with the other grades ranging higher according to quality. The amount of waste papers collected depends upon and is largely governed by the market price. Last Spring the price (Chicago area) rose from $9.00 per ton in January to $15.00 in April due to the strong demand incident to peak production of the paperboard mills. During the fall, with low production requirements, the reverse took place and prices dropped to $5.00 a ton.

Such wide fluctuations are detrimental, not only to the waste paper dealers, but also to the mills and stress the need for adequate storage facilities. During the past year storage space has been added by the mills both in the East and in the West to build up inventories in periods of slack demand for use when the production schedule is heavy, or when interruption to transportation might interfere with a continuous incoming supply. A comparison of the inventories held the first of the year and those at the close shows a substantial increase has been made.

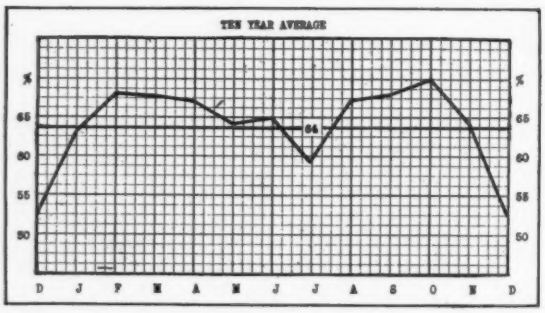


CHART II

Domestic and Imported Pulp

The supply of pulp in this country is derived from importations and domestic production. Canada, Sweden, Finland and Norway are the principal exporting countries, and the Northern, Southern and Pacific Coast states produce the major portion of the domestic output. There are no separate statistics covering pulp consumption in paperboard mills, but the Department of Commerce, Bureau of Foreign and Domestic Commerce, publishes a summary of the tonnage imported and the American Paper and Pulp Association has issued a statement of domestic production. The following is given for 1936 together with a preliminary figure for 1937:

Items	1936	1937 E	Per cent Gain
Imports	2,277,800	2,394,800	5.2
Domestic	5,720,800	6,664,100	16.5
Total	7,998,600	9,058,900	13.2
Exports	193,500	302,100	56.1
Net Available	7,805,100	8,756,800	12.2

E—The figures for 1937 are estimated.

It is known that the inventories of pulp were greater at the close of the year than on January first and that the domestic consumption of all grades was less than the 8,756,800 tons available. Thus the 12.2 per cent gain cannot be considered as the increase in usage in 1937 over 1936.

Seasonal Variation in Production

In the past the monthly activity of paperboard mills has followed a pattern termed "seasonal variations" in which a Spring and Fall increase is recognized and a corresponding Summer and Winter decrease. 1933 and 1937 failed to conform to the usual trends, due to general business conditions in the midsummer of 1933 and the recession last Fall. This situation emphasized again the close relationship between paperboard and the general volume of output, particularly by the non-durable goods manufacturers. Years in which a light Spring and heavy Fall volume occur are usually followed by years of greater tonnage; whereas the reverse of the pattern forecasts a lesser volume. The major part of the production in 1937 occurred during the Spring, and if history repeats itself, 1938 opens with a less favorable outlook for the year than did 1937. However, another factor has to be recognized which lessens the loss and adds to the gain. It is the yearly growth in the industry, where the uses for paperboard are expanding into new fields.

Chart II. The activity of a normal year by months is the subject of Chart II. The upturn in the first quarter of the year reflects the requirements for cartons and shipping containers by the wide variety of manufacturers who cater to the Spring and Summer trade. Likewise, in the Fall the holiday and winter trade causes an increased demand.

Activity in Paperboard Mills

The activity of paperboard mills is an expression of the time operated as contrasted with possible op-

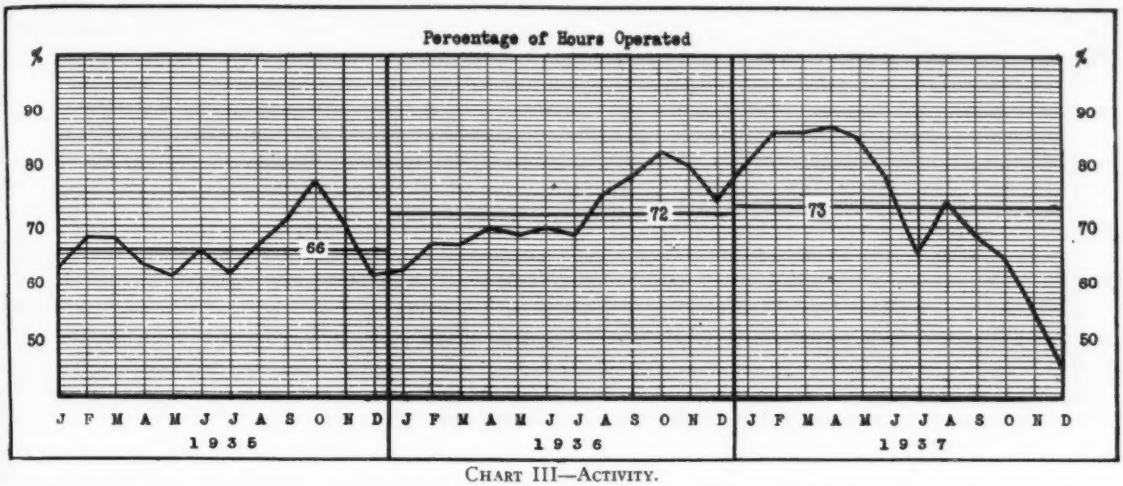


CHART III—ACTIVITY.

eration of 144 hours (6 days) per week. It is stated as a percentage to show a comparison, month by month, or for similar months in prior years.

Chart III gives the per cent of activity for the years 1935, 1936 and 1937. The high rate in the first part of 1937 is in marked contrast to the percentages found in 1935 and 1936. Again, in the Fall of 1937, activity was far below that of the preceeding years.

The yearly averages of 66, 72 and 73 per cent, respectively, show the increase in operating time experienced by the mills, but do not fully express the increase in output. A study of the hours operated contrasted with the tonnage made develops the fact that each year there is a gain in the average speed of the mills due to greater plant efficiency.

Orders and Production

Incoming orders expressed in tons are contrasted with production to indicate the manner in which the demand is being satisfied by the supply.

Chart IV is drawn to represent the tons of incoming orders (- - - - broken line) and the tons produced (——solid line) by reducing each to a percentage. The rated capacity divided into actual tons gives the per cent for each series of figures. When orders are in excess of production the intervening area is white, for the reverse it is black.

During 1935 and 1936 the spread between orders and production varied but little and was largely confined to the seasonal upturn periods. In 1937 the large spread occurred in the Spring when for a time it seemed that a scarcity of board might be in prospect. Idle mills were brought into production and available capacity was used almost continuously. By Summer the wave had passed and the remainder of the year shows the black area in prominence.

Days to Run

The expression "Days to Run" designates the length of time necessary to fill the orders remaining on the books, specified for delivery but not yet completed. Chart V. shows these in bar form and it will be noted that the trends up and down follow the same movement as that found in Chart IV.

Chart V. The days to run have an important effect on mill costs since a large bank of orders permits the selection of similar grades to be run at the same time. The preparatory operations and machine setting can be done once for a number of orders, thus avoiding the delays incident to grade changes. The reverse is true with but few unfilled orders and the constant changes reduce proportionately the tonnage output per hour. Operating cost in a paperboard mill cannot be sharply curtailed in periods of slack demand since the fixed charges, which are constant,

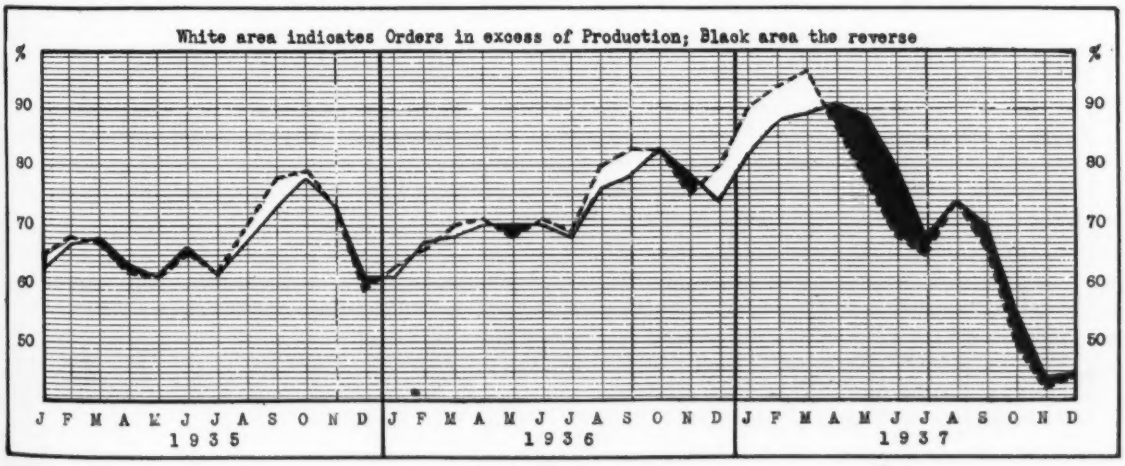


CHART IV—ORDERS AND PRODUCTION

represent such a large proportion of total cost. As a result, when orders are low, such business as is done is at a high cost per ton.

With mill activity averaging 84 per cent the first half of 1937 and orders on hand calling for over 12 days of running, a saving was made in conversion cost which offset to some extent the high prices of raw materials. The reverse was experienced in the second half year, with operations down to 62 per cent and the bank of orders below 6 days to run.

Production of Mills in the Industry

Production each year is obtained by taking a special census of all the mills known to have made grades falling within the scope of the industry. During the past 10 years the total tons output was as follows:

Year	Tons	Year	Tons
1928	3,833,800	1933	3,854,300
1929	4,222,000	1934	3,859,100
1930	3,896,500	1935	4,438,200
1931	3,736,500	1936	5,246,300
1932	3,274,900	1937 E	5,500,000

E—The figures for 1937 are estimated.

The 1937 figure is, of necessity, an estimate since replies have not been received as yet from all the mills. The estimate of 5,500,000 tons is made by comparing the performance of identical mills representing in the aggregate 85 per cent of the industry. The tonnage reported by these same plants for the first 26 weeks as compared with the last 26 weeks is given in the following table. Nearly 10 per cent more of the total for 1937 was made in the first half year than was the case in 1936.

Periods	1928-1932	1935	1936	1937
1st 26 weeks	51.7%	47.4%	46.7%	56.4%
2nd 26 weeks	48.3	52.6	53.3	43.6
Full year	100.0%	100.0%	100.0%	100.0%

It is now evident that the pattern for 1938 will be more nearly like that of 1935 with the volume heavier during the second half year. By reference to Chart III, the trend by months throughout that year can be seen.

Prices Increased by Labor and Material Costs

Prices were advancing at the close of 1936 and continued to increase during the first quarter of 1937. This was influenced by higher labor and material costs, a strong demand and the apparent desire on the part of buyers to cover their requirement before further advances could take place. The top was reached in April or May, when the buyers forecast that the market would fall and began to scale down orders. The decline in production and the loss in unfilled orders show the rapidity and extent to which the change in conditions affected the industry.

At the close of the year prices were below the January levels, having lost more than the total gains made in the first quarter. It is notable that during the price decline no sharp breaks occurred such as have characterized similar losses of volume in the past. Unlike many industries, a reduction in price of paperboard does not bring increased consumption; it merely induces some buyers to purchase a little earlier than they otherwise would. Such a loss in sales price constitutes a heavy premium for the tonnage obtained.

Prospects for 1938

The prospects for 1938 have been referred to in the foregoing as less bright than those confronting the industry a year ago. With the volume of demand dependent to a large extent upon general business conditions, reference might be made to the many eminent economists who have made predictions for the coming year. These vary all the way from a volume equalling 1937 to 10 or 15 per cent below. However, all agree that the first half of the year will be below that of last year and that the last half will be well in excess.

The paperboard industry, although one of the oldest in the country, is still a young industry in its ability to grow. There are no competing substitutes for paperboard and paper and through the ingenuity of its sales forces and the inventive genius of its operating departments, the industry has not only replaced with its products more expensive material, but has also developed many new uses where paperboard has proved its worth.

A comparison with other industries reveals the fact that paperboard does not sink so low nor reach the excesses found in the wide swing between periods of prosperity and depression. It is a fortunate industry in this respect and, with its ability to grow so well proven in the past, the prospects for many years to come are for bigger and better things.

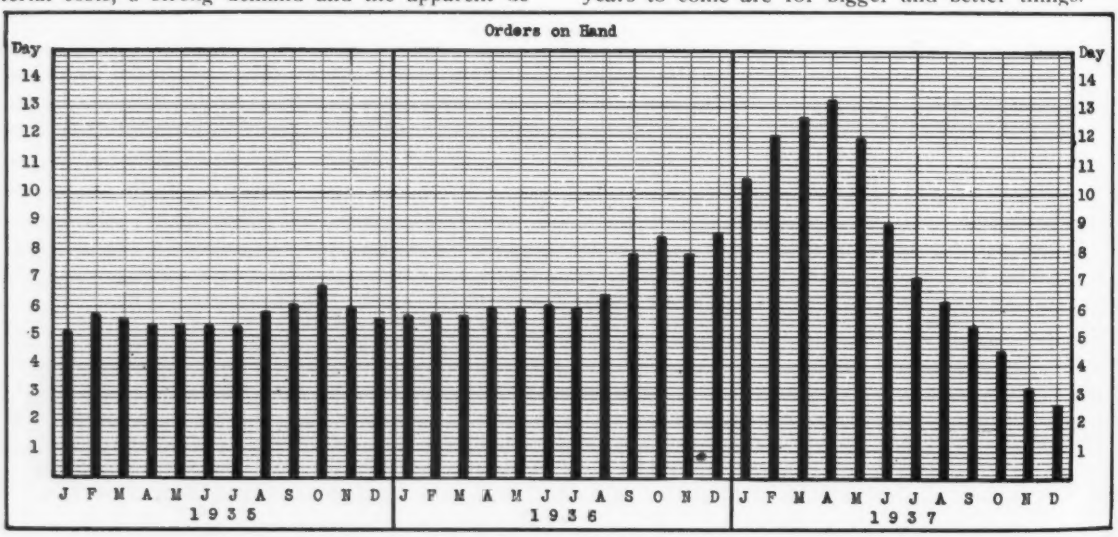


CHART V—DAYS TO RUN

Newsprint Production in Canada for 1937 Sets High Record for the Industry

By C. L. Sibley, Regular Correspondent of the PAPER TRADE JOURNAL

The fortunes of the newsprint industry in Canada during the past year are graphically illustrated by the following table showing the monthly production figures for 1937, as compared with 1936:

	1937, Tons	1936, Tons	Per cent Change
January	287,691	227,955	+26.4
February	275,532	221,569	+24.4
March	301,110	243,900	+23.9
April	298,347	258,721	+15.5
May	309,232	267,067	+15.7
June	310,871	270,051	+15.0
July	314,520	274,627	+14.6
August	318,713	270,053	+18.0
September	312,351	269,782	+15.8
October	314,594	301,106	+ 4.4
November	302,236	285,771	+ 5.7
December	293,038	289,312	+ 1.3
Totals	3,645,309	3,179,914	+14.3

It will be seen that the year started with a relatively enormous increase in production as compared with the same period of the previous year, and that while this increase was well maintained until well on in the year, there was a rapid falling off in the last quarter, with hardly any increase for December. As a matter of fact the year started out with high hopes and a buoyant outlook, and ended with dwindling demand, a rather menacing state of over-production, and considerable uncertainty as to what the future might hold. This situation naturally has its bearing on the advance in price announced for 1938 and put into force on January 1st last, an advance considered absolutely essential in view of the fact that during the year fair wage clauses, collective labor agreements, heavy taxation, increased cost of men working in the bush, as well as higher operating costs all round, had been forced on operators.

A Year of Surprises

Surprises seem to be the order of the day in the newsprint industry. A few years ago, there were not many newsprint manufacturers in Canada who dared to hope that they would live to see newsprint demand overtake the then existing production capacity of Canadian mills. Then came 1936 to mark such an astonishing recovery that production far exceeded any previous record. The year 1937 opened with a production, in its first month, of more than 26 per cent in excess of that for January in the previous year, and although this rate of increase was not equalled in any of the succeeding months, the increase was maintained at such a high level, month after month, that down till August it was still 18 per cent higher than in the similar month of 1936, and right down to the end of the year, production still continued to be higher than in the corresponding period of the previous year.

The figures are worth noting. The production in 1936 was approximately 3,200,000 tons, a gain of nearly 440,000 tons, or 16 per cent, over 1935, and actually 17 per cent over the production in the banner year of 1929.

In total effective capacity, the newsprint mills of Canada were rated in 1936, by competent engineers, at 3,860,000 tons a year, which was between 40 and 50 per cent of total world capacity, Quebec province alone having about double the capacity of England. While the total rated capacity was 3,860,000 tons, it was pointed out by Charles Vining, the president of the Newsprint Association of Canada, that it was impossible to have every machine in every one of the mills at full rating every hour of the 309 working days. He came to the conclusion, therefore, that the maximum production limit of all mills in Canada in 1937, was between 3,600,000 and 3,700,000 tons. As the Canadian production in 1937 was higher by 454,710 tons than in the record year of 1936, the total output was 3,645,309 tons, so that taking the year as a whole, the Canadian mills were running at their practicable capacity and in some months even higher than the average of that practicable capacity.

Talk of Newsprint Famine

The result was that 1937 had not far advanced before there was a discussion of a prospective newsprint famine, this being given added color by the news of the dwindling sources of raw material in Europe. The immediate consequences were:

(1) United States newsprint publishers were advised to spread their orders evenly over the whole year, stocking up in the months of relatively small consumption so as to ensure adequate supplies in the months of heavy consumption.

(2) Many Canadian companies undertook expensive additions to their plant and equipment. A great deal of this work was rehabilitation which had necessarily been deferred by the low price levels of the depression years.

(3) The Canadian newsprint manufacturers made an early announcement that the price of newsprint would be increased from the base of $42.50 per ton for New York delivery to $50 per ton for the first six months of 1938 and to $55 per ton for the second half of 1938.

The Question of Price

Such was the position and the prospects until the summer. Then the Great Northern Paper Company provided a new, though not altogether unexpected, angle to the discussion on price prospects, by announcing that its price for newsprint for the first half of 1938 would be $48 per ton for the first six months and $50 per ton for the second six months. Here a new surprise entered into the situation for, contrary to established precedents, the Canadian companies held to the price levels they had already announced, intimating that they would no longer be governed by the rule that their prices should conform to the lowest price quoted by a competitor. The American Newspaper Association made strenuous efforts to get the manufacturers to abide by the rule, circularizing their members on the subject, and, in October, issuing a bulletin to both American and Canadian publishers from which the following is quoted:

"If Canadian manufacturers are forced by their Governments and banking pressure to bring about conditions as set forth above, the newsprint industry will be faced again with the possibility of decreasing consumption, which they say has brought about what they term 'chaotic prices' of the past five years. If you buy Canadian newsprint, you can help your source of supply by telling them exactly how you feel about the possibility of paying $2 a ton more for newsprint in the first half, and an indefinite amount a ton more in the second half of 1938, than your competitor may pay, and what you propose to do if such a condition eventuates."

In respect to the reference to Government pressure, it may be explained that both Premier Hepburn of Ontario and Premier Duplessis of Quebec, had announced that they would not allow the newsprint companies again to bring the industry into peril by unrestricted competition. Premier Duplessis uncompromisingly declared that price slashing would not be allowed, adding that the Government had plenty of power to bring recalcitrant companies into line. He indicated that a newsprint company having hydro-power interests might be tempted to cut newsprint prices because it could make up the revenue by the sale of hydro-electric energy, and such a procedure the Government set its face sternly against.

Business Recession a Bombshell

Into this situation the effects of the business recession in the United States dropped like a bombshell. The discovery appears to have been made quite suddenly that the advice offered by the manufacturers to the publishers to spread their orders evenly, so as to stock up in months of comparatively low production, was acting like a boomerang, for it was found that unexpectedly large excess inventories had accumulated.

Thereupon, the leading Canadian companies put their working forces on a five-day a week schedule, bringing production down to only about 4 per cent in excess of that at the corresponding period of the previous year. Naturally a new spurt was given to the discussion of price, and a clarification of the issue was provided in November by the International Paper Company's announcement that it would extend the basic price of $50 a ton, already announced for the first half of 1938, to include the whole year. This announcement was followed by a similar decision by most of the other Canadian newsprint manufacturers.

From the above it will be seen that while the Canadian newsprint industry is not by any means enjoying the plain sailing which seemed to be indicated at this period a year ago, it does start the New Year in a stronger position than it has had for many years past, since it now seems to have definitely abolished the policy of "Save yourself who can, and devil take the hindmost."

Industry's Morale Greatly Strengthened

The importance of these evidences of real co-operation among the producers is stressed by the President of the Newsprint Association of Canada, Charles Vining, who says:

"During 1937 the Canadian Newsprint industry made a new high record of production, added materially to its effective mill capacity and gained slightly in its average selling price. More important than any of these, it made notable progress in management and morale and can now see daylight through some of the weaknesses of policy which have beset it for nearly a decade. The combined result is that, despite a carryover of excess inventories and the probability of considerable lower tonnage volume, the industry is entering 1938 in what is fundamentally a sounder position that it has occupied for some years.

"The industry's progress in management and morale during 1937 demonstrated itself by the extent to which Canadian companies have extricated themselves from the interlocking contract system of selling newsprint, and also by the good sense with which the mills met the business recession during the closing months of the year and curtailed their production accordingly.

"The interlocking contract system has been probably the most vicious and unsound feature of the industry's position during recent years. Its consequences were fully demonstrated in 1935, 1936 and 1937, when, for three consecutive years, the Canadian industry's price was governed by the conduct of a single seller. In the last two of these years the single seller was a United States mill having circumstances different from those of the average Canadian producer.

"Interlocking contracts have, however, gradually been eliminated by Canadian mills and, although some tonnage remains under this form of contract, sufficient progress had been made by the end of 1937 to place Canadian companies in a position to decide and carry out their own policies in a normal way. For the first time in many years, the Canadian industry thus has an opportunity to establish its self-respect and the respect of its customers by demonstrating its own sales policies. It has already given indication that it can be relied upon to follow a moderate and sensible course consistent with the close interdependence which exists between newsprint producers and consumers.

"Curtailment of production by Canadian manufacturers during the past three months has been somewhat haphazard, but it has been sufficient to show that that industry's management has improved to a point where the previous obsession for tonnage has given way to an appreciation of stabilized marketing. In other industries, curtailment of production to fit current consumption is a commonplace procedure, but this has not been true of newsprint mills during the past few years. Their performance during recent months has consequently been significant of a more encouraging point of view."

Prospects For Present Year

As for the prospects for the present year, it is fully expected that production for the first quarter will be at a low level. What will happen after that will depend upon the progress of business recovery in the United States. The best that is anticipated is that for the whole year production will average around the level of that of 1937, but judging by the present outlook the general expectation is that it will be several hundred thousand tons less. On the other hand, even if it should be some 500,000 tons less, the gross value at the $50 a ton price will be around $13,000,000 more than for the larger volume of 1937.

As against this, it has to be remembered that owing to renovations and enlargements the productive capacity is larger this year than it was last year and in addition the new mill of the Ontario Paper Company at Comeau Bay, Que., will come into operation early this year with a designed capacity for some 350

tons of newsprint per day. With this exception no new mills or machines have been built. Taking the new Comeau Bay mill into account, it is expected that the average production rate will be about 70 to 75 per cent of capacity, which in most industries would be regarded as a very satisfactory rate. If this should be achieved, then, with higher prices in effect, and with manufacturers united as never before in a policy of co-operation, the present year will prove not unsatisfactory.

Another factor which has to be taken into consideration is that while in 1937 the margin between world newsprint demand and supply appeared to be about the same as in 1929, or slightly less, the 1937 situation differed from that in 1929 in several important respects. For example:

(a) In 1929 the world was on the edge of a depression; in 1938 no prolonged recession is looked for.

(b) In 1929 large blocks of new newsprint capacity were under construction or in prospect; in 1938 the new construction in sight is negligible.

(c) Since 1929, world consumption of wood pulp has increased by over 4 million tons a year, and wood resources of the north European countries have been tapped to an extent which indicates the end of expansion there.

(d) Only one-quarter of this increase in world pulp consumption has been due to newsprint; the other 3 million tons' increase has been caused by growth of other pulp products including important new commodities; building materials, containers, artificial textiles and plastics.

Future expansion of newsprint supply is therefore not only a matter of mill construction, as it was in 1925-29, but of available wood and pulp supply in competition with other pulp producers. There is no doubt as to ability of many existing mills to expand their capacities by speeding up and plant improvements, when necessary expenditure is justified, and this potential capacity might be sufficient to obviate construction of new mills or machines for some time to come. The real future doubt appears to lie in the economics of obtaining or using wood pulp for newsprint in competition with the profit to be derived from other pulp products.

The Overseas Markets

The outlook in the overseas markets has changed somewhat in the past year. Canada has been exporting newsprint regularly to over 30 countries besides the United States, and the demand from these countries has tended to increase. The price continues steady, at an average delivered level of about £13.15.0 per long ton, which is substantially higher than in 1936 and 1937, although the net does not show much increase when higher costs of production and delivery are taken into account. A constructive factor during the past year was the conclusion of a seven-years' agreement between a group of Canadian mills and Australian and New Zealand publishers constituting the large part of the consumption of this important market. This agreement should add some tonnage to Canada's overseas sales and should also create stability to the mutual advantage of consumers and producers. It is quoted as offering an example of goodwill and common interest between publishers and Canadian mills which may prove helpful in wider spheres.

While the result will be an increase in shipments to Australia, this increase will be offset by losses in Japan and China, and on the whole it would appear that Canadian tonnage to overseas markets will be approximately the same this year as it was last.

Canada's Most Important Industrial Group

The pulp and paper industry maintains the position it has held for the past 15 years as the most important industrial group in Canada with respect to employment and wages and salary distribution, while with regard to the net value of production, it is second only to central electric stations. A Government report, issued at the beginning of last year, showed the number of pulp and paper mills in operation to be 93. Of these 25 manufacture pulp only, 44 both pulp and paper, and 24 paper only. There are 24 companies directly engaged in making newsprint. These companies have 40 mills, of which 20 are in Quebec, 14 in Ontario, one in Nova Scotia, two in New Brunswick, one in Manitoba, and two in British Columbia. The Government has not yet issued complete statistics for 1937, but it is noted that the Canadian production of standard newsprint in 1936 formed 72 per cent of the total North American production for that year. The world production of newsprint was estimated at about 8,220,000 tons, to which Canada contributed over one-third, or about 39 per cent, producing over three times as much as her nearest competitor Great Britain, which contributed 12 per cent of the total. The United States produced 11 per cent of the world total, Germany 6 per cent, Finland and Japan each 5 per cent, France and Newfoundland each 4 per cent, and lesser amounts from other countries.

Huge Investment Interest

It is estimated that the Canadian newsprint industry represents an investment of some $600,000,000 or $700,000,000, and that the replacement value of the newsprint mills alone, as growing concerns, is at least $400,000,000 without valuation of timber limits or subsidiary power plants. In respect to the latter the newsprint industry, for both primary and secondary requirements, accounts for at least two-fifths of Canada's total power development, and there are single mills in the industry which use considerably more electrical energy per annum than is used to light the cities of Montreal and Toronto combined.

The newsprint industry keeps something like 100,000 men at work in the woods and mills, and some thousands more engaged in supplying transportation and other services. Altogether, it is estimated that at least half a million people directly depend upon it for livelihood. What it means in terms of foreign trade may be gathered from the fact that during the difficult years from 1930 to 1935, the newsprint industry, in spite of its disrupted condition, brought to Canada from foreign sources a total of $563,000,000, compared with $475,000,000 of gold production in that period.

Record of Paper Production

The Canadian production of paper increased almost four times in the period from 1917 to 1936, in spite of the decreases in 1921, 1930, 1931 and 1932. Practically all the different kinds of paper used in Canada at the present time can be produced in Can-

adian mills. The production and value from 1928 to 1936 inclusive are as follow:

Year	Quantity: Newsprint, Tons	Quantity: Other Paper, Tons
1928	2,414,393	434,806
1929	2,725,331	471,818
1930	2,497,952	428,835
1931	2,227,052	384,173
1932	1,919,205	371,562
1933	2,021,965	397,455
1934	2,604,973	464,543
1935	2,765,444	515,452
1936	3,225,386	581,943

	Value: Newsprint	Value: Other Paper
1928	$144,146,632	$40,158,773
1929	150,800,157	42,189,095
1930	136,181,883	37,123,991
1931	114,419,637	32,210,252
1932	85,539,852	28,333,271
1933	66,959,501	29,730,374
1934	86,811,460	34,080,765
1935	91,762,201	37,316,185
1936	105,214,533	41,217,401

Note.—In the above tabulation "other paper" includes book and writing paper, wrapping paper, paper boards and other paper products.

Newsprint Exports in 1937

The quantity and value of newsprint exports from Canada in 1937 were as follows:

	Cwt.	Value
January	5,190,863	$9,254,137
February	4,458,890	8,011,776
March	5,898,695	10,659,613
April	5,055,809	9,217,217
May	5,894,519	10,733,319
June	6,132,911	11,401,689
July	6,103,263	11,234,434
August	5,662,569	10,662,990
September	6,173,095	11,303,766
October	6,046,507	11,167,970
November	6,312,840	11,572,240
December	6,174,832	11,247,263
Total	69,104,793	$126,566,322

The total value of the exports of newsprint and pulp in 1937, as compared with 1936 was as follows:

	1937	1936
Newsprint	$126,566,322	$103,639,634
Pulp	$41,815,731	$31,247,014
Total	$168,382,053	$134,886,648

Germany Looking to Canada for Pulpwood

One of the most interesting developments of the year was the visit to Canada during December last of a German delegation of forestry experts investigating forest resources in Quebec as a possible source of supply of pulpwood and lumber for Germany. The visit caused more than ordinary interest because of the report that the Consolidated Paper Corporation, which owns Anticosti Island, might sell that island, or at least its stand of pulpwood, to the German interests. This aroused public opinion, on the ground that it would be a danger to Canada to allow the Germans to establish themselves on the island, which occupies a strategic position in the Gulf of the St. Lawrence. Undoubtedly some kind of a deal was under consideration for representatives of the Consolidated Paper Corporation took the German delegation to the island, and the German experts spent several weeks making a survey of the property. They returned to Montreal early in the new year and then left for Germany without a deal being announced, but with the declaration that the matter was still under consideration. The head of the delegation, Dr. Heinrich Woollert, in a statement to the press, said they were under no obligation to purchase any property, and might decide it was preferable to purchase cellulose products. He intimated that the delegation represented only private enterprises in Germany and the Netherlands. Purchase of Scandinavian lumber, he said, was becoming increasingly difficult, as Finland had prohibited, under its forest conservation program, the export of more than the natural increase. Thus Germany and Holland must begin to look elsewhere. The Reich, he said, was pushing forest conservation, and he suggested a visit to Canada to study their methods, which were quite advanced.

The question of whether Germany would pay in cash or goods for any Canadian lumber which might be purchased, he said, did not arise. His commission had nothing to do with the financial end of it; they were just experts. The harbor expert of the party, for instance, was not brought along to consider building a port at Anticosti but for advice on the cheapest method of getting the lumber to Germany. He explained that purchase by the Reich of West Coast lumber was prohibitive, due to the high cost of transport to Germany; hence the stress on the Atlantic seaboard.

"This would be the first time," explained Dr. Woollert, who was accompanied for the interview by Frederick Kreide, "that Europe might buy lumber in America. We Germans like to do things thoroughly, and hence the experts. We want to know just what it would cost us if your lumber proved satisfactory, and when we make our report on our return we have to know everything there is to know about it."

Anticosti Island formerly belonged to the French chocolate magnate, Henri Menier, is 135 miles long by 35 miles wide and has an area of 3,200 miles. It is densely forested largely with a rather superior type of conifer, well suited for the manufacture of pulp, and is estimated to contain 15,000,000 cords of pulpwood. Under the Menier regime large quantities of rossed pulpwood were exported to American mills. Subsequently the island was purchased by the Wayagamac Paper Company, which later was taken over by the Consolidated Paper Corporation.

The Allied Lumber Industry

The pulp and paper industry in Canada has two allied industries—the lumber industry and the hydro-electric industry—and as many of the firms engage in all three, the fortunes of the subsidiaries have an important bearing on the net results. Of the lumber industry it may be said that it had a moderately successful year, despite some setbacks. The year began under particularly favorable circumstances. Inventories were low, demand was good in the face of advancing prices due to scarcity of stock, and the prospects seemed unusually promising. This proved to be the case until August; after that a pronounced decline developed which prevailed until the close of the year. While the situation thus created caused a certain amount of uneasiness, especially with new production coming on the market, the general opinion seemed to be that there was nothing to be unduly anxious about, although liquidation of stocks had the effect of forcing prices down somewhat during the fall months.

The warning, coming as it did in August, gave the operators the opportunity to control their logging activities accordingly, with the result that the production of logs this winter for sawn lumber purposes will be governed so as to guard against over-production. An exception may be made in the case of hardwood lumber, the stocks of which are said to be none

too plentiful. The net result is that an unusually large percentage of logging operations this winter will find their way into pulp and paper channels.

During the first few months of the year car-loadings in both Eastern and Western Canada recorded a remarkable increase over the corresponding period of 1936. This increase registered between 30 to 50 per cent, but dwindled somewhat towards the close of the year. Exports from Canada to the United Kingdom for three-quarters of the year showed a substantial increase over 1936, by approximately 167,000,000 feet. In October, however, a marked decline became noticeable. Ocean freight rates have been increasing to such an alarming extent that the situation has a tendency to jeopardize the exporting of lumber to Great Britain. Throughout the year it was extremely difficult to charter boats or even reserve space, due to the fact that war supplies were being shipped from Canada on an extensive scale.

Trade with the United States during the past year also recorded satisfactory improvement, but towards the close began to weaken.

The British Columbia lumber industry established an all-time record in production in 1937, when the output of logs totalled over three billion feet. Two-thirds of the lumber manufactured in that province is shipped to outside countries. Exports to Great Britain and the United States showed an encouraging increase over 1936. A valuable market for British Columbia in the Orient has been somewhat disrupted owing to the war conditions prevailing in the Far East.

At the time this review was being compiled the question of triangular trade agreements affecting Canada, Great Britain and the United States was under consideration, in connection with the proposed Anglo-American trade treaty. The effect of these agreements on the lumber industry cannot be analyzed until all the plans are formulated and announced.

As in the case of the pulp and paper industry, cost of production has been increased all round and from the same causes. However, the industry is well controlled, stability in general is being maintained, and the price of lumber is reasonable, consistent with the considerably increased cost of doing business.

Water Power Developments

The pulp and paper industry, which uses enormous quantities of power, has been an important factor in the rapid development of the hydro-electric industry in Canada, and in the past year has been directly responsible for additional installations. As at January 1st, 1938, the total turbine installations in the Dominion amounted to 8,112,751 h. p., a net increase of 167,161 h. p. in the past 12 months. Over 88 per cent of all water power in Canada is developed by central electric stations, and 98 per cent of all electricity generated for sale is produced by water power. The output of the central stations for 1937 is estimated at 28,000,000,000 kilowatt hours, the highest figure on record, and five times the output of 1919. Over 40 per cent of this output was used by the pulp and paper industry, in addition to power produced within the pulp and paper mills. Only one country (Norway) has a greater output per capita, and only one country (United States) has a greater total output irrespective of size.

Some of the more important installations during 1937 may be enumerated. In the province of Quebec the Saguenay Power Company brought into operation the twelfth and final unit of 45,000 h. p. of its plant at Ile Maligne on the Saguenay River. At Outardes Falls, on the Outardes River, the Ontario Paper Company is completing a 70,000 h. p. hydro-electric plant to operate its new paper mill and townsite at Comeau Bay, Que., ten miles distant. Preliminaries are now under way for further installations in the St. Maurice Valley, the most important pulp and paper manufacturing district in Quebec province. The Shawinigan Water and Power Company and the Brown Corporation are commencing operations for the construction of a plant near La Turque on the upper St. Maurice River. The initial installation will comprise four vertical units of 40,500 h. p. each and settings are to be placed for the later installation of two similar units.

In Nova Scotia the Minas Basin Pulp and Paper Company is proceeding with the second and final stage of the St. Croix River development by the installation of a 2,500 h. p. unit at Salmon Hole. The Nova Scotia Power Commission has been receiving tenders for the construction of a 5,200 h. p. plant at Cowie Falls, on the Mersey River, to supply the increasing power demands of the Mersey Paper Company at Liverpool, N. S.

In Northern Ontario, to meet increasing power demands from the Abitibi Canyon development (originated by the Abitibi Power and Paper Company), transmission and distribution facilities are being extended. In the Sudbury district new capacity is being provided from the Crystal Falls plant on the Sturgeon River, recently acquired by the Hydro-Electric Commission of Ontario from the Abitibi Power and Paper Company. The Commission is also constructing improved transmission facilities on its Thunder Bay System. At Montreal Falls, on the Montreal River, the Great Lakes Power Company completed a 10,000 h. p. plant early in the year, and is reported to be commencing the construction of a second development with a similar installation at the mouth of the same river. Part of this power will go to a proposed new sulphite pulp mill at Michipicoten. In the Georgian Bay district the Ontario Hydro Commission is constructing a plant at Ragged Rapids on the Musquash River. An installation of 10,000 to 12,000 h. p. is under construction.

In Manitoba the municipality of Winnipeg is adding a third unit of 12,500 h. p. to its Slave Falls station on the Winnipeg River.

In Saskatchewan the Churchill River Power Company added a new unit of 19,500 h. p. to its 42,000 h. p. plant at Island Falls, on the Churchill River, while in the Lake Athabaska district the Consolidated Mining and Smelting Company is constructing a 6,000 to 7,000 h. p. hydro-electric plant at Goldfields.

In British Columbia a second unit with a capacity of 47,000 h. p. has been added to the plant of the Western Power Company of Canada at Ruskin on the Stave River.

Delphos Paper Mill Sold

The Delphos Paper Mill, of the Hinde & Dauche Paper Company, has been sold to the Albermarle-Chesapeake Company, of West Point, Va. No information is available as yet as to what disposition is to be made of the property by the purchasing concern.

Wood Pulp Industry Makes Notable Progress As Production and Distribution Soar

By O. F. Swanson, Sales Mgr., J. Andersen & Co., and the Pulp and Paper Trading Co.

Wood pulp has held a leading position in the paper and textile trades for many years, but probably never enjoyed the brisk demand it did during the first 5 months of 1937 except possibly through the period of the World War. Commencing with the second half of 1936, its popularity grew steadily for almost a year until it reached the point where the sellers "ruled the roost", both in regard to prices and allotments of tonnage for distribution to their various customers. This great demand resulted in a record-breaking production, a substantial increase in prices and developments of epic proportions in the industry.

Wood Pulps and the Business Recession

The year of 1937 began on a rising tide of optimism and hope for even better business than prevailed in the second half of its predecessor. Evidently, these high expectations were not altogether well founded, because the year ended on an outgoing tide of miscalculations, disappointments, grave misgivings, and a very obscure picture of the future. To err is human, but to cry over spilt milk is wasting time. Hence, to fix the blame for the present recession in the pulp business is not so important because what has happened is over the dam, and it is like "Humpty-Dumpty, who sat on the wall, and had a great fall, and all the King's horses and all the King's men could not put Humpty-Dumpty together again". However, to find corrective measures, and the sooner the better, is imperative for the welfare of the business but before any attempts are made to prescribe reasonable and sound remedies, the symptoms of the ailment must be carefully analyzed, in order to make a correct diagnosis, which is necessary for proper treatment to effect a cure.

Effect of Production and Demand

It has been inferred that the slump of business in general, the increased production, together with high prices and frequent disturbances in the commercial and political fields, throughout the world, may be considered belonging to the group of causes for the recent upheaval in the pulp business. Be that as it may, the fact remains that no victim is ever found guilty on hearsay, and it is not at all unlikely that the above mentioned assumption is far away from the real reason or reasons for the partial collapse of the business structure. It is said that "Where there's smoke, there's fire", and only time will tell the tale, but it goes without saying that the great expansion of the kraft business in the South, together with the increased production of other chemical pulp, both on this side and abroad did not aid the pulp business in any way. This additional tonnage must now be reckoned with and, as Southern kraft pulp is very suitable for many purposes and also on account of its comparatively low manufacturing costs, it is already a most important factor in the trade.

Situation in Imported Kraft Pulp

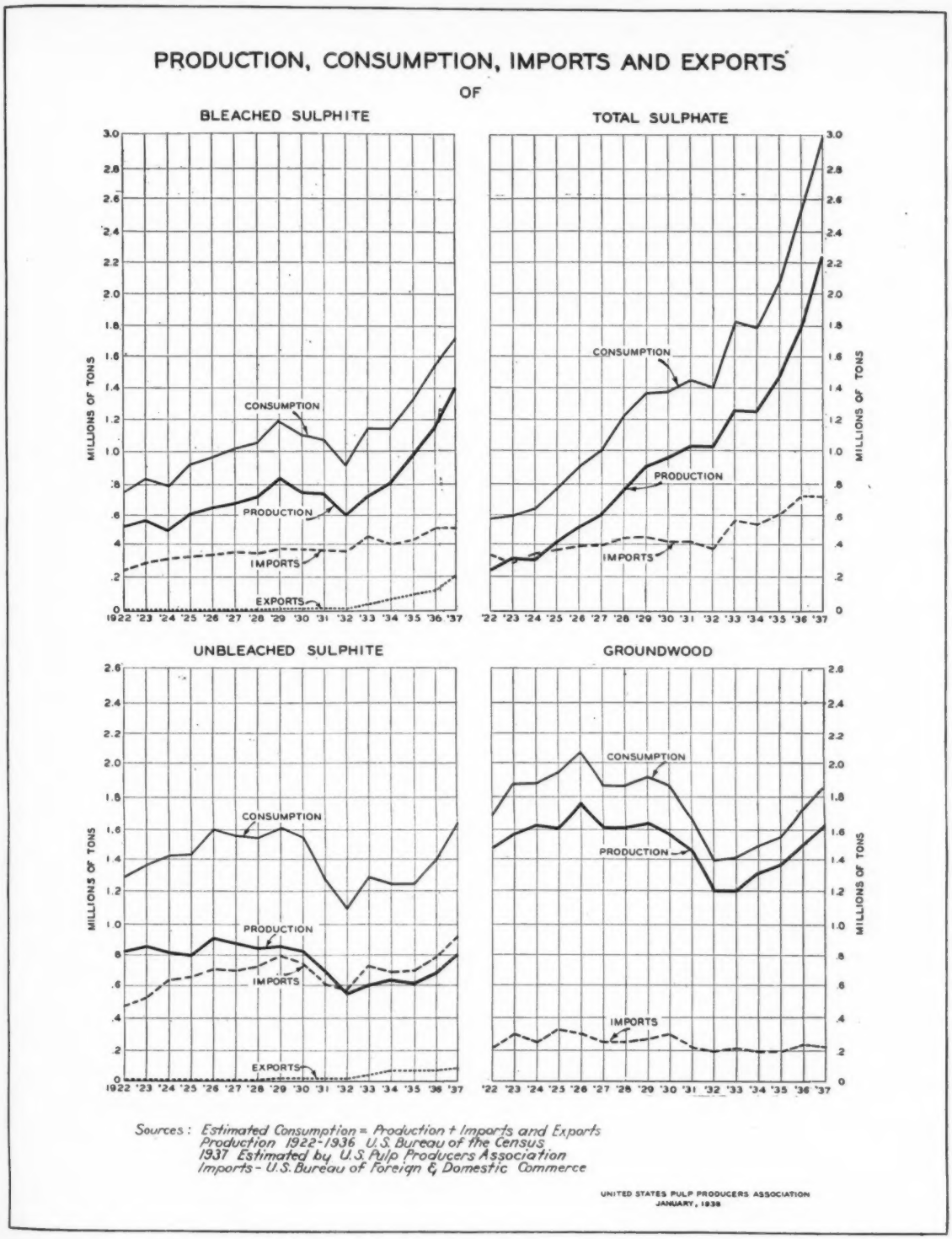
For several reasons, it is only reasonable to surmise that imported kraft pulp has reached the crossroad, where one direction leads to lower price levels and fairly sizable business and the other to diminished business and somewhat higher prices. With all due respect to the quality of Southern kraft pulp—whether bleached or unbleached, it is safe to predict that there will always be a market in the U. S. A. for a fair tonnage of kraft pulp made from northern wood, whether in this country, Canada or abroad but until the present surplus of all grades of chemical pulp has been absorbed or at least greatly reduced, either by increased consumption or other means, importation of all grades and especially kraft pulp is bound to suffer in more ways than one.

Expansion of Pulp and Paper in the South

The saga of the southland developments is like a fairy tale and notwithstanding the fact that, relatively speaking, the pulp and paper business of the south was, a short time ago, in its infancy, it is today not only gigantic in size and modern to the 'nth degree, but has also other commendable features. The entire enterprise is a reminder of daring deeds by the pioneers of old, of their aggressiveness, foresight and determination to conquer seemingly insurmountable barriers for the purpose of developing something new and useful for themselves, for others at the time of inception and for the happiness of future generations. Very few, if any, of these pioneers of old made much headway at the start, and the results of the efforts of our recent pioneers differ widely in this respect. They have been more, shall we say, fortunate in their undertakings which, figuratively speaking, started off with a bang and, if it is not already the case, promise to become the greatest of its kind from almost every point of view within the near future. In addition to kraft, sulphite pulp and soda pulp products of highest qualities are also turned out at the rate of hundreds of tons per day in the south, and its latest baby is named newsprint, who is reported to be doing as nicely as can be expected, considering its tender age and unfamiliar surroundings.

Increased Consumption of Kraft Pulp

According to reports from various reliable sources, the consumption of kraft in the U. S. A. has increased more than 10 per cent a year since 1926, which is largely due to America's demand for attractive packages, paper bags and fiberboard containers for the distribution of merchandise of numerous kinds and for other articles also. Should Europe develop this mode of packing to the same extent we have, the tonnage of kraft pulp manufactured there could easily be absorbed in their own home market which, perhaps, could also make use of some southern kraft pulp. During the first 4 or 5 months of 1937 even the most sensible members of the woodpulp industry and most conservative buyers were swept along, to some degree, by the tide of over-optimism and over-action. During this period, the question of price was of minor consideration, but to cover anticipated


PRODUCTION, CONSUMPTION, IMPORTS AND EXPORTS
OF
BLEACHED SULPHITE
TOTAL SULPHATE
UNBLEACHED SULPHITE
GROUNDWOOD
MILLIONS OF TONS
CONSUMPTION
PRODUCTION
IMPORTS
EXPORTS
1922 '23 '24 '25 '26 '27 '28 '29 '30 '31 '32 '33 '34 '35 '36 '37
Sources: Estimated Consumption = Production + Imports and Exports
Production 1922-1936 U.S. Bureau of the Census
1937 Estimated by U.S. Pulp Producers Association
Imports - U.S. Bureau of Foreign & Domestic Commerce
UNITED STATES PULP PRODUCERS ASSOCIATION
JANUARY, 1938

requirements was apparently of vital importance, as a shortage of pulp was expected in some quarters. Based upon available statistics, imports of chemical pulp during 1937 exceeded 1936 by approximately 6 percent in tonnage and 16 per cent in value. Imports of ground wood show a decrease in tonnage of about 4 per cent, but an increase in value of 7 per cent.

Average Price Difference Larger Last Year

The average price difference between 1936 and 1937 based upon contract prices over the two years is considerably larger in favor of last year than indicated here but, as only a rather unimportant tonnage of the high priced pulp has actually been re-

ceived and paid for, it is impossible at the moment to predict what will happen when shipments of the same start on a large scale. If prices on paper and board do not advance considerably, surely no buyer can use this top-priced pulp without a great loss, and this unfortunate condition, if not corrected soon enough, might force some of the so-called converting mills out of business. Many of these friends are already asking for relief in the way of postponement of deliveries and reduction in prices. So far, the situation has been handled calmly, and there is every reason to believe that sympathetic and friendly cooperation between all concerned will eventually iron out the difficulties. It has been done in the past, and no doubt will be done again.

"An Appeal to Everybody"

These last sentences remind me of a book I have recently read, written by Mr. Axel Wenner-Gren, the title of which is "Vadjan Till Envar" (An Appeal to Everybody) and published by Albert Bonniers Forlag, Stockholm, Sweden, in which the author deals with various questions concerning business and other topics in a most interesting and philosophical way, and I am taking the liberty of trying to make a free translation of a few of Mr. Wenner-Gren's thoughts, for insertion in this article, which I believe will be found interesting to his many friends both on this continent and elsewhere. If this book is also printed in English, it should enjoy a wide-spread circulation in the trade. My conception of the original text in part is, as follows:—

"Investigation and technique on modern principles has placed means at our disposal for the creation of welfare (happiness) for all, and if our endeavors could be guided to serve mutual aims to its fullest extent through scientific research, technical skill and modern organizing ability for the purpose of making full use of cooperative efforts, coupled with fair distribution of practically speaking, all our unlimited earthly resources, we would soon arrive at the threshold of a new era. No comments about this are necessary, as it speaks for itself, except that this kind of writing should act as a tonic for this jittery age.

Resale Tonnage of Chemical Pulp Large

While it is generally conceded that the tonnage of chemical pulp offered for resale since June of last year has been very large and probably larger than ever before over an equal period and that this most assuredly must have had a detrimental effect on the market, nevertheless, prices obtained for resale lots usually enabled the original buyer to transact the business without a loss, because the pulp had originally been purchased when prices were lower than at which equal qualities could be procured at the time of the resales. According to recent reports, the consumption of chemical pulp has increased, and consumers throughout the U. S. A. are taking deliveries at the rate of about 15% higher than in December of last year. Should this improvement continue that in itself should have a beneficial effect on the market within a few months.

Stocks on Hand Complicate Current Situation

Buyers are as yet not interested in placing orders for further business direct with the pulp mills, either for prompt or forward deliveries, and no sellers appear to be making serious overtures for new business. To a great extent, this is undoubtedly due to the report that about 350,000 tons are stored at the various docks on this side and, before this tonnage has been moved or at least greatly reduced, they probably feel that it would only tend to aggravate the situation by piling on new shipments. Exactly how long this situation is going to last, nobody knows but, for the reason mentioned above and the anticipated improvement of business in general within the not too distant future, the tonnage on the docks should be reduced considerably, before arrivals of shipments commencing with reopening of the Baltic Navigation.

Effect of Price Reductions

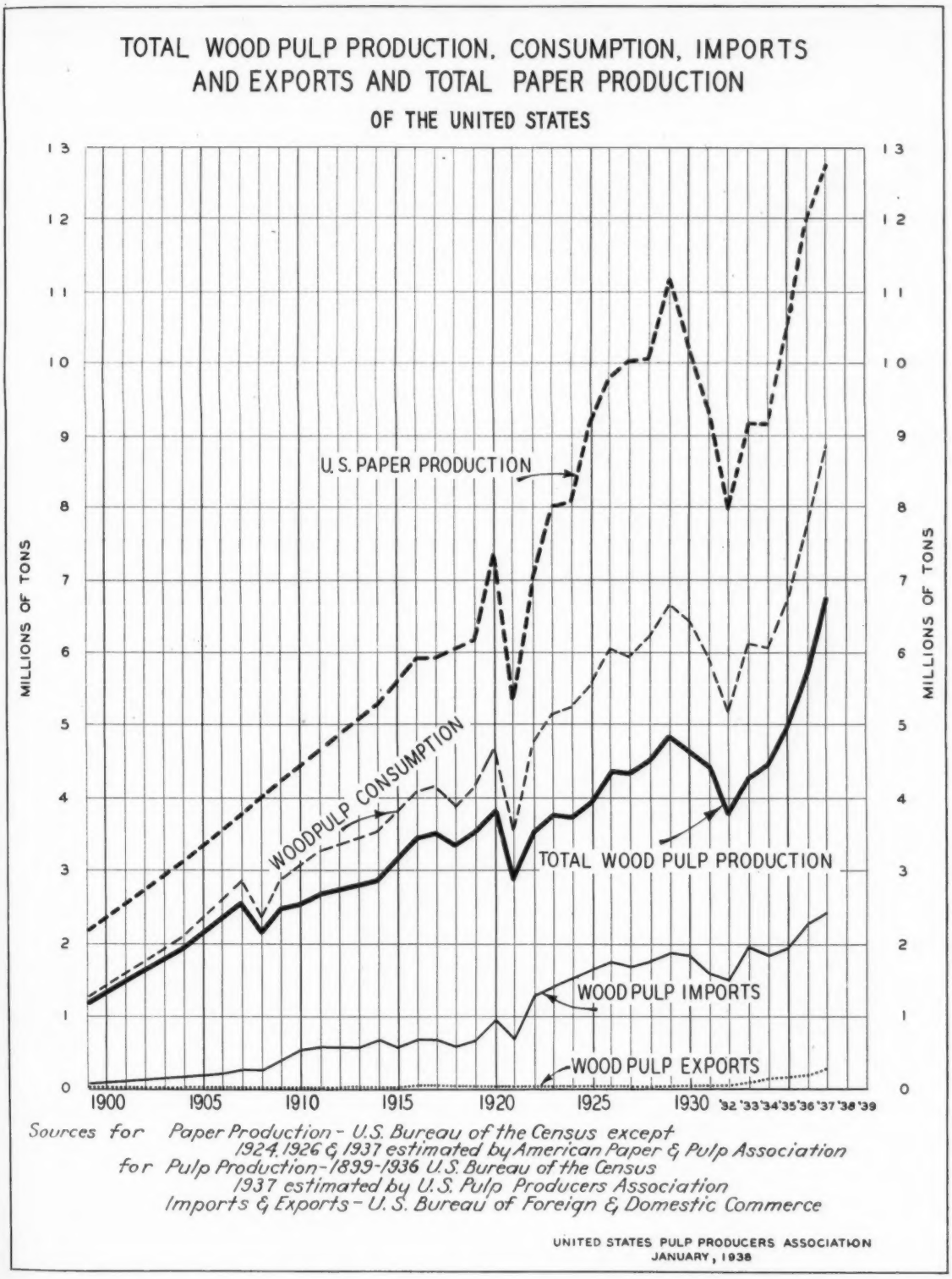
When the American pulp mills lowered their contract prices by approximately $10 per ton on both bleached and unbleached sulphite for deliveries throughout the first quarter of this year, the Canadians selling in this country generally followed suit, although this was not strictly the case in every instance. The mills abroad, however, are evidently awaiting further developments, before arriving at a decision whether or not adjustments in prices on existing contracts for forward deliveries should be made. American and Canadian mills are reported to have already done so. With a few exceptions, no particular progress was noted in regard to improvement in the quality of any kind of pulp, the pulp mills as a rule evidently being satisfied to maintain their standards. Some perhaps slipped a trifle occasionally in this respect and a few probably improved the grades somewhat.

No Complaints on Quality of Pulp

There were practically no complaints of serious nature on the quality during the first half of the year and very few during the second half, which indicates that the process of manufacturing was carefully watched. However, whenever the buyers are overstocked with orders for their products, they are not nearly as exacting as when they are fighting for new business. This might also be one reason for the peaceful operation during the year in this respect. Rejections of shipments on account of inferior quality are practically a thing of the past, which is partly due to the greater uniformity of the pulp, to the better equipment in consumers' mills, and also to more skillful treatment of the stock which in modern mills is frequently tested in the laboratories before being permitted to be used in the mills. In spite of diligent research in the fields of many raw materials, there is, as yet, no threatening substitute for woodpulp and this knowledge has no doubt encouraged capital for investment in pulp and paper mills.

Dominant Position of U. S. A. in Pulp Trade

The United States has for many years held the lead by a wide margin as the world's largest producer, consumer and buyer of woodpulp and, in addition, it has recently become an important exporter of chemical woodpulp and, especially of bleached sulphite of excellent quality intended for the manufacture of rayon, cellophane and other commodities outside of the paper industry. Canada has also exported a large tonnage of the same kind


TOTAL WOOD PULP PRODUCTION, CONSUMPTION, IMPORTS AND EXPORTS AND TOTAL PAPER PRODUCTION
OF THE UNITED STATES
MILLIONS OF TONS
U.S. PAPER PRODUCTION
WOODPULP CONSUMPTION
TOTAL WOOD PULP PRODUCTION
WOOD PULP IMPORTS
WOOD PULP EXPORTS
1900 1905 1910 1915 1920 1925 1930 '32 '33 '34 '35 '36 '37 '38 '39
Sources for Paper Production - U.S. Bureau of the Census except 1924, 1926 & 1937 estimated by American Paper & Pulp Association
for Pulp Production - 1899-1936 U.S. Bureau of the Census
1937 estimated by U.S. Pulp Producers Association
Imports & Exports - U.S. Bureau of Foreign & Domestic Commerce
UNITED STATES PULP PRODUCERS ASSOCIATION
JANUARY, 1938

of pulp for the same purpose, as well as other grades. The largest sales overseas from both countries last year were made to Japan, where the rayon industry has developed by leaps and bounds during the last decade. It is also reported that Sweden, Norway and Finland have been shipping large quantities to Japan, not only for the textile industry, but also for the manufacture of paper and board.

Although the United States is the largest pulp producing country in the world, an important tonnage

of the pulp required for paper and board mills here is being supplied by Sweden, Canada, Finland, Norway, Germany, Czechoslovakia and the Baltic provinces and, should these sources of supply cease to furnish certain grades of chemical pulp, these mills would undoubtedly find it difficult to maintain the qualities of their well-known and established brands. If history repeats itself, which it is likely to do, prospects for the pulp industry are no worse than they have been at various times in the past. However, cooperation between buyers and sellers and government and business has probably never been more essential than it is today and, as they all depend upon each other for their very existence, if any one of the four suffers, they are all seriously affected. Consequently, it would seem logical that strenuous efforts should be made by all concerned to cooperate for their common good because, as already mentioned, salvation of the pulp and paper industry and possibly other industries as well lies chiefly in complete cooperation.

Cooperation and Curtailment Needed

In reality, there are very few new causes for the present business recession, the majority being old hangovers which, undoubtedly, can again be cured by the same methods as previously. Some critics, however, both inside and outside the business, are still very skeptical, and seem to think that remedies successfully administered some years ago will be of no avail this time. The keynotes for speedy recovery are cooperation first and curtailment of production second and, if these are disregarded, it might mean eventual chaos for the pulp business. In spite of all the disturbing factors during the second half of 1937, there is a persistent feeling in the trade that, on the whole, it was not such a bad year after all and it is expected that, by the time we enter the second half of this year, the upswing in business will be well under way.

High Mill Activity and Relative Firm Prices Aided Chemical Industry Last Year

Written Especially for the Annual Review Number of the PAPER TRADE JOURNAL

As paper mills operated at a high average rate during the first nine months of 1937, the demand for paper chemicals, such as, salt cake, rosin size, casein, alum, soda ash, etc. moved very well during this period of time. However, when business dropped off in the fall, the consumption of chemicals rapidly declined and in some instances prices also declined, although generally speaking, chemical prices remained firm during 1937. The outlook for 1938 is uncertain. However, if business gets under way again at a good rate, it is quite certain that the chemical industry will be favored.

Casein

Production of Casein for 1937 was quite heavy. The year started with prices quite high. With heavy production and falling off in demand late in the summer, the prices dropped so that the year ended with prices considerably below the early part of 1937. The prospects for 1938 are that the average price is expected to be lower than for 1937.

China Clay

Consumption in 1937 was quite heavy and the prices were firm throughout the year. Due to the higher labor schedules, it is believed that prices on clay will hold and may be even slightly higher in 1938.

Chlorine

Shipments in 1937 were at a fair rate with the decline in the last quarter being felt by all producers. Deliveries during the summer months were somewhat behind, as usual, due to the extra demand during these months. Expectations are that with the increased production which will be available during 1938 that this condition will not exist this year.

Rosin Size

Rosin and rosin size were firm for most of the year. 1937 started out at fairly high levels due to the very heavy demand, not only in this country but in other countries. America supplies about 70 per cent of the world's requirements of rosin. Toward the end of the year, however, rosin and rosin size prices dropped somewhat.

The prospects for 1938, at least until the course of business changes for the better, are uncertain, particularly, as the heavy production of rosin occurs in the late spring and summer when prices ordinarily are at the low point. The average price for 1938 will probably be lower than 1937.

Soda Ash

The decline in shipments during the last quarter of 1937 was rather severe in soda ash but it would appear that the 1937 average would be above 1936. The first nine months showed an appreciable increase over the same period of 1936 and indications are that no unusual increase in shipments is expected until at least after the first quarter of the year.

Sulphate of Alumina

The demand for sulphate of alumina was very good during most of the year. This applied to both commercial and iron free grades. Prices were firm with very little change from 1936 schedules.

Assign Parchmentizing Patent

Chester D. Rockwood, president, and Kenneth L. Osmun, chemist, assigned to Union Selling Company, 406 Elm Street, Cincinnati, Ohio, Patent 2107343, covering their joint invention of a process of treating paper stock to produce a parchment-like effect. Their process utilizes a solution of zinc chloride and formaldehyde as a bath in which the paper is introduced in a particular manner.

Paper Stock Favored by Improved Demand Only in First Half of Last Year

By Walter R. Hicks, Jr., of Daniel M. Hicks, Inc.

For twenty years Walter R. Hicks contributed an annual review of the paper stock market to this journal. Mr. Hicks died last December. His many friends and acquaintances in the paper industry will be interested to know that this article was written by his son, who for some time has been associated in the business with his father.

Hereafter is a market resume for 1937 on Rags and Waste Paper. Same is valid and justified because in 1937 there was a market for Rags and Waste Paper—witness the aforementioned hereafter. We are not the least bit concerned over the state of affairs as we write this in the first week of February, we're just wondering whether there will ever be occasion for such a review hereafter. So if you're all set to go back to the good old days—come aboard the showboat. But we warn you the last act is fraught with misery.

Price Trend of New Rag Prices

New rags in general advanced steadily through January—No. 1 White Shirts hitting nine cents in the middle of February, a cent a pound rise over January first, held through the Summer at this figure, dropping to $8.75 in the latter part of August, off again in October about fifty points, tumbled to $7.35 in November, rallied to $7.50 in celebration no doubt of Thanksgiving (which day incidentally we understand is to be renamed Supplication Day this year) and went to bed at $7 on Christmas Eve.

Unbleached Muslins saw the light of day on New Year's morning at $8.25. They wasted no time in advancing courageously to $9.25 in February. In October they retreated to $8.75 and were slaughtered along with a few million turkeys in November which found the grade at $7.50 and that's where it was when the celebration began in Times Square.

Whoever bought light Flannelettes should have paid about $5.50 anytime they got their hands on them, whether said extremities were encased in mittens or wrapped around a mashie niblick.

Blue Overalls exhibited a market tendency to shine, due to continual bench warming in the factories dominated by one J. Lewis. The stock left over sold at $6.75 until February, $7 until April when the peak of $7.50 was reached. They too sat down around July and never got up again. They lost fifty points in October and still another fifty in November, going home to trim the tree at $6.

Washables waxed their skis New Year's morning at $3.00 and slid through ninety points with nary a Christiana on the way.

Rise and Decline in Old Rag Prices

Used and abused rags were bought and sold during the year in much the same way as in the past except that perhaps there was a little emphasis on the buying in the early weeks, and a lot of the stuff in back yards hasn't thawed out from the Washington's Birthday cold snap yet. Just around this time No. 2 Roofing brought 195 cherries and we wouldn't tell a lie either. Buying apparently stagnated at this point for the best natured P.A.'s in the country couldn't prevent the market from sagging bit by bit to $1.10 in June. Suppliers were prevailed upon to hold for a little fancier prices through the Summer and in September were forced to take as high as $1.40. From then on the mills got careless and all sorts of people sneaked roofing in at increasingly uncomfortable decreases and claims in the closing weeks came in on the basis of seventy-five cents.

The vanishing Silecias could be enticed from the woods at $5.50 for a week or two—but couldn't be seen for less than $6.75 from then on until September. Exactly 26.041% of the reputed purchase price of Manhattan Island would suffice for one hundred pounds until November. Here they were less popular even at $5.25 and could be procured for any old cigar store at a nickel during the Christmas "rush."

Number One Whites (every ounce repacked) could be had, buttons and all, for $3.00 for about three weeks. But at this point they spruced up a bit and demanded $3.25 and a 30 hour week. Undaunted and with fire in their eyes they whizzed through the hot months at $3.75 at which figure they held until November. Hereabouts they retarded to $3.50 and closed out at $3.40. It has the distinction however of being about the only grade to close better than it opened—sort of like a beach umbrella.

Market Trend of Waste Paper

There was a time when handling Mixed Papers was considered a legitimate business enterprise. That wasn't long ago either. For instance in January mills were paying $4.00 and were happy to sweep out the bottles and tin cans, whistling at their work. You will even remember May, distinguished as always by the perennial flowers and birds and the Union Square Garden Party and extra-specially in '37 by seventy cents Mixed. They had come in like a lion when March was going out like a lamb and hung around until the warmer Spring zephyrs caressed our bulging purses. But as the thermometer rose, Mixed wilted, gradually to be sure but kept going right on down when the mercury fell in the Fall and the first snow flurries found them hopelessly bogged at $3.00—with everyone knowing darn well that waste paper can't be packed for less than $5.00. It must be the turnover.

Folded News hit seventy cents in May having opened at fifty and likewise closed lower at thirty cents.

Ledger sold for a dollar bill in January climbed to $1.30 in February, hitting $1.55 in August. It hit the skids in November and closed ignominiously at six bits.

Old Kraft Papers experienced the same sort of rise, its peak being April, however, when it was bringing down $1.85. It slipped to $1.55 in July, dropped another forty points by October and in November—Zowie! Seventy-five cents. The round sum of seventy cents was being realized when the Christmas shopping was all over.

No. 1 Hard White hit $2.60 in May opening at $2.10 and down to $1.90 as the man with the scythe breathed his last.

Hard White Envelope Cuttings gained 50/60 points by May, reaching $3.25 at the time. They survived the Thanksgiving doldrums fairly well, hitting $2.35 then. The grade recovered briefly in early December but—you knew it all the time—holed in for the Winter at $2.50.

So what? Your guess is as good as ours. Those of us who bump into the hyprocrites that wished us a Happy 1938 would seem justified at time of writing in punching them right in the nose. If this justification disappears or even diminishes in the few weeks to publication, it will be just jim dandy—but the clouds of pessimism pervading the atmosphere right now will take a lot of sunshine for even the smallest rainbow to appear. There is small consolation in the happy picture painted above of the first half of '37, followed as it was by the third and fourth quarter holocaust. But as your local Congressman will say on the Fourth of July—"This great country of ours, our unlimited natural resources, the courage of our people—er—er have a cigar."

Unprecedented Activity in Kraft Paper Made 1937 Most Unusual Year

By W. H. Anders, President Kraft Paper Association

The kraft paper industry has just passed through one of the most unusual years in its history. Entering 1937 with the largest unfilled orders file it had ever carried forward, new orders continued to accumulate and all production facilities were operated at capacity for many months. Record weekly quantities of new orders were all out of proportion to any past experience, or most optimistic forecasts. Never since the early '20's had the industry witnessed so favorable a market situation. These conditions underwent a gradual unfavorable change, starting about the middle of the year, which became accentuated as time progressed until the year ended with conditions almost the reverse of those at the start of the year. Within about a six months' period the industry had passed from unprecedented activity to relative stagnation. It shared this experience with American business in general although it appears that the kraft boom and recession were both proportionally greater than that experienced by many industries.

Trend of Kraft Production

These swift changes in the kraft industry were the result partially of certain inherent characteristics of the kraft business. The kraft industry is definitely a service industry since its products are largely wrapping and packaging materials used primarily by retail stores to enclose merchandise sold. The kraft industry is sensitive, therefore, to the volume trend of retail merchandise sales. In serving the consuming trade, however, the kraft manufacturers deal mainly through paper merchants and converters of paper products. This naturally involves inventories of stock in the hands of these intermediaries. By the middle of 1937 these inventories had been built up to high levels partially in preparation for anticipated heavy consuming demand in the fall, and partially as a speculation against rising prices. The sharp decline in mill volume experienced during the latter part of the year was, therefore, the result not only of the recession in general business but also arose from the necessity of liquidating the excessive intermediate inventories.

Lock of Reserve Capacity to Meet Demands

During the early part of 1937 the industry was handicapped by the lack of sufficient reserve capacity to handle expeditiously the unprecedented peak demand. During 1936 and 1937 the industry had entered upon a new construction cycle aimed to expand greatly the existing producing capacity. Few of the new mills, however, were ready for production before the middle of the year. These additional production facilities are now available and the industry capacity has been so expanded as to be able to meet any probable peak requirements that may arise in the next few years. Undoubtedly the fear of shortage of kraft paper and inability to secure prompt shipment was a factor in influencing the accumulation of excessive intermediate inventories in 1937. This situation has now been corrected and it is hoped that the reserve capacity now available will aid in overcoming the necessity for speculative accumulation of stock in the future.

Prospects of the Industry for 1938

It is believed that intermediate inventories have been materially reduced by the end of 1937. It is probable that they were still somewhat above normal and it was anticipated that mill demand during the first quarter of this year would continue at a fairly low level although slightly better than for the last quarter of 1937. It is our hope that before the end of the first quarter there will be an improvement in consuming volume. Due to the general uncertainty in all business at this time, there appears to be little prospect that retail merchandise sales will equal the level established in 1937 and, accordingly, it is not anticipated that the consuming demand for kraft paper during 1938 will be as great as that experienced last year. The industry is optimistic, however, in the belief that conditions will show a gradual improvement throughout the year.

Paper Week in New York Is Well Attended

Sixty-first Annual Convention of American Paper and Pulp Association at the Waldorf-Astoria Is Big Success — Affiliated Organizations Also Hold Meetings — Topics of Timely Interest To The Industry Are Discussed.

The Sixty-First Annual Meeting of the American Paper and Pulp Association and affiliated organizations, was held at the Waldorf-Astoria Hotel, New York, February 21-25, was largely attended with guests from other countries present.

Election of Officers

At a meeting of the Board of Governors on Thursday, the following officers were elected:

President, D. C. Everest, Marathon Paper Mills Company, Rothschild, Wisconsin.

Vice President, W. H. Anders, Nashua River Paper Company, East Pepperell, Mass.

Vice President, Hugh J. Chisholm, Oxford Paper Company, New York.

Vice President, Stuart B. Copeland, Northwest Paper Company, Cloquet, Minn.

Vice President, R. J. Cullen, International Paper Company, New York.

Vice President, Ralph A. Hayward, Kalamazoo Vegetable Parchment Company, Parchment, Kalamazoo County, Mich.

Vice President, H. L. Jenkins, George O. Jenkins Company, Bridgewater, Mass.

Vice President, John R. Miller, West Virginia Pulp & Paper Company, New York.

Vice President, W. J. Raybold, Rising Paper Company, Housatonic, Mass.

Vice President, J. L. Riegel, Riegel Paper Corporation, New York.

Vice President, F. J. Sensenbrenner, Kimberly-Clark Corporation, Neenah, Wis.

Vice President, C. Alfred Wagner, Stevens & Thompson Paper Company, New York.

Vice President, Norman W. Wilson, Hammermill Paper Company, Erie, Pa.

Vice President, J. D. Zellerbach, Crown-Zellerbach Corporation, San Francisco, Cal.

President Everest's Address

For the sixty-first time we are gathered here as the representatives of one of the most necessary industries on earth. Last year, in making his annual address, Mr. Sensenbrenner said "American industry has at last responded to the influences of economic revival. A broad period of prosperity seems to lie ahead. The opportunity for the Pulp and Paper Industry to share fully in this prosperity seems clearly defined." He also called attention to the fact that 1936 was an all time record for paper consumption.

What looked like a return of business activity on a reasonable basis turned out to be the greatest example of extremes we have ever seen. From the highest to the lowest rate of operation in less than six months was the record of 1937. Despite the precipitate drop during the last few months, 1937 stands as the all time peak of paper production.

North American newsprint production reached a new high figure of 4,944,000 tons or a half million tons more than in 1936. It is interesting to note that Canada produced 74 per cent; United States 19 per cent; Newfoundland 7 per cent. Canada's increase was 455,000 tons or 14.2 per cent over 1936.

Board production exceeded all previous years. The amount of square footage entering into the manufacture of boxes was by far the greatest ever known.

But with these record breaking performances for the overall yearly period, the months of November and December showed about as low a rate of operation as we have seen for years.

D. CLARK EVEREST, President

The one important feature of this spectacular performance was the fact that the price structure did not collapse. This was undoubtedly due to the rapidity with which the drop in business occurred. Had this been a gradual decline in tonnage placed, the sharpshooting incident to such a slump would probably have wrecked the whole price structure.

During the past year there have been constantly increasing costs, particularly in labor, wood and coal. Added payroll taxes and other taxes have also contributed to rising costs. Manufacturers have become cost conscious and they have displayed good sense in the way this recent slump has been handled. No one can make any money on recent

rate of operation. With a turnover, in normal times, of once the capital invested each year, no one can become very affluent on a fifty-three per cent operation.

Last year, as Mr. Sensenbrenner stated, we were looking forward to a well sustained business; whereas this year, if you judge by the past three months, the outlook is not so rosy. If, however, you will analyze the gradual increase in business in the several divisions each week, you will see that we are gradually recovering our position. Any favorable news may set us off at a rapid pace. When you think of the purposes for which our products are used and the rate of increase in consumption over the last few years, it is only logical to suppose that our business for the year 1938 will at least equal 1936. Once a new use for paper is developed, it is seldom discontinued, and new uses are being developed every day.

I cannot get excited about the present situation. It is probably true that producers of newsprint may have several months of low rate operations, as publishers and merchants undoubtedly loaded up in anticipation of the higher contract price, and there will not be much activity until those inventories are exhausted.

In almost every other line there is evidence that inventories have been depleted. Merchants and consumers have been working on inventories for several months and these are bound to be used up shortly. The Kraft Paper Industry is a good example. Everyone thought there were large inventories of kraft on hand and yet for the week ending February 5, the new orders placed amounted to 21,395 tons, or at the rate of over 1,100,000 tons per annum. When you compare this with the low weekly average of 12,450 tons for November and December, you will note there is a decided pick-up in demand for kraft.

Other divisions are showing similar trends. We are on our way out of this temporary slump.

I am not so much worried about demand for our products as I am about the things which may be thrust upon us through governmental or legislative action. If there was ever a time when we needed a good strong Association, it is now. When we go through slumps as we have recently, there seems to be a wave of economy sweep over the industry and the first thing some people think of is to try and cut out association dues. This always occurs when they need their association most. I strongly urge that you do not cut your budgets on association work. It may be necessary to spend more to protect yourself and your industry.

Let us not lose our sense of proportion. We have a good association supported by a number of good divisional associations. The personnel is good. They are loyal and they have no limit of working hours. They are as much interested in their work as though they owned the industry. We are set up to do the things and to give you the factual data required in your business.

This year we are faced with some very serious problems. Perhaps the first will be the contemplated reciprocal trade agreements with Great Britain and with Canada. The Secretary of State has included numerous grades of paper in his proposed list of products which may be affected. I doubt very much if there has been any pressure from Canada to have these papers included, yet they are in the list and we must prepare to defend ourselves against such action. It is not the difficulty we may have from Canadian imports alone, but the moment such reduction is made in the Canadian agreement, it is automatically extended to all other countries with which we have agreements. We are still making readjustments in domestic production due to the Reciprocity Act of 1911. Someone must look after our interests and we must have unified action. Where can we get it except through this Association? Any tinkering with the tariff in times like these is bound to work serious hardships on the industry and through it on the men who are employed in it. The industry has done a good job in maintaining employment and a high rate of wage, but we cannot continue to do this if we are to lose such tariff protection as we now have. I know that the two International Unions are opposed to such action and will aid us in this fight.

We shall also be faced with some sort of wage and hour legislation. No one knows what form this will take, but again we must be prepared to protect our interests, and there is no way except through our Association.

There will be juggling of the so-called Anti-Trust Laws, the intention being to make them more severe. What should be done is to liberalize these laws and to clarify them so people may interpret them. There is no danger of a monopoly in this country. A monopoly is a racket and any racket which is productive of profit cannot long exist without competition and when there is competition, there is no monopoly. With the technical and managerial brains and money available today, there is no danger of monopoly. Some smart person will duplicate any profitable effort. Again counsel and the Committee on Public Affairs must be alert to protect our interests.

Laws dealing with labor requirements on government contracts such as the Walsh-Healey Act may be amended and made more stringent. Laws relating to sales activities such as the Robinson-Patman Act will bob up to confuse us. Stream pollution legislation is bound to be forthcoming. All these and probably hosts of others will be hanging over us. Many of these will become the new rules and the new agencies just as the Wagner Act with its National Labor Relations Board has become a part of our business regulation. We do not have time to study these proposed laws and if they are passed we do not have time to analyze them and to find out what we are required to do to conform to them. Again our Association is our opposing factor to proposed unfavorable legislation and our interpreter when enacted.

I think few people realize how much work is done by the staff and by Committees to head off things which might have had effect on our business. It is difficult to explain to people why so much effort may be put on nebulous proposals which are made by government or other agencies, but we have felt that if these are killed in the incipient stage, we save a great deal more effort and expense.

I wish to thank all those who have given so liberally of time and expense in trying to make our Association work effective. The Chairmen of the several committees and particularly the Chairmen of the Finance Committee and the Public Affairs Committee, are to be commended for the good work they have done for us.

I wish to again stress the necessity for adequate

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support of this Association. We are in an "experimental age." Things move faster than ever before. We must have information about our business and have it promptly. These extraneous things may affect our business to a certain degree but the good old fundamental facts are still the things to guide us in shaping our policy for the future. The more complete the data the better chance of charting a safe course. All of the divisional associations need your support. This is no time to trim sail on association work. Given the proper tools with which to work, I am confident that with the intelligence we have in this industry, we will be able to keep pace with other industries and retain our place in the national picture.

I am not a prophet and usually when one presumes to make predictions, he gets into trouble but I honestly feel that consumption of paper during 1938 will finally wind up in a position midway between 1936 and 1937.

Technical Association Luncheon

The annual luncheon of the Technical Association of the Pulp and Paper Industry was held Wednesday in the Grand Ballroom of the Waldorf Astoria Hotel. The exceptionally large gathering listened to a talk by Mr. George Welp, Manager of the Interchemical Corporation, New York City, on "Selling Speed" after President G. N. Collins had introduced the guests at the speaker's table. Mr. Welp spoke as follows:

The speed of a falling body is set by physicists at 118 miles per hour. The speed of a falling business which does not keep the pace being set by its competitors has not been computed, so far as I know. But speed is the spirit of our times. Those who forget this or who do not choose to believe that it is so are left by the wayside. With streamlined deisel-driven trains, pleasure cars with three-figured speedometers, record-breaking superliners, and airplanes that have gone as fast as seven miles a minute, it can hardly be doubted that the world today demands speed.

Selling speed is the concern of nearly every branch of trade. It is certainly the concern of the Graphic Arts industry. In your business and in our business the call comes for Speed — not speed alone, but speed with beauty, speed with precision, speed with permanence—speed with no diminishing of any quality of craftsmanship. The paper which you bought this morning rolled off the press at a rate of 35,000 copies an hour. Just a few years ago press speeds half as great were considered exceptional. Yet with these tremendous speeds, today's paper is a finer printing job than ever before. The cuts are cleaner, the type prints sharper, and the ink is less inclined to smudge.

CHARLES W. BOYCE, Secretary

NEW GRAVURE SPEEDS

Intaglio printing has achieved new speeds. And with these new speeds comes a quality of color gravure which outshines the best that could be done at the older, slower rates. Now roto magazines with circulations as high as 7,000,000 copies are run off in handsome colors every week.

Publishers of relief printed magazines selling at the price of a bag of peanuts demand a quality of printing found heretofore only in the limited-circulation, slowly produced periodicals. They ask for split second drying and staggering production schedules—with no sacrifices in cost or quality. What is more they get them! You all know the story of *Life*. Its publishers asked for a magazine printed on coated paper, using plenty of color, and printed on a four-day, up-to-the-minute news schedule. It sounded impossible.

But you paper manufacturers got to work and developed a paper that met these exacting specifications. I understand that *Life's* coated stock is now turned out in 60 inch rolls at a rate of 600 feet per minute. I am proud to say that the ink maker had something to do with making *Life* possible, too. By introducing a new kind of printing that dried not in hours but in split seconds, IPI's Vaporin process brought the means of producing copies at the terrific rate which the publishers required.

SPEED MARCHES ON!

Advances in press machinery plus the all-important factor, the skill of an expert printer, complete the picture and *Life* magazine, with all its original "impossible" requirements, is a reality. Today, other magazines have schedules as breathtaking as the one which *Life* demands. And as each week passes, other publications join the parade.

It is small wonder that the production end of the Graphic Arts industry is being constantly challenger to set new speed records. Now news is flashed

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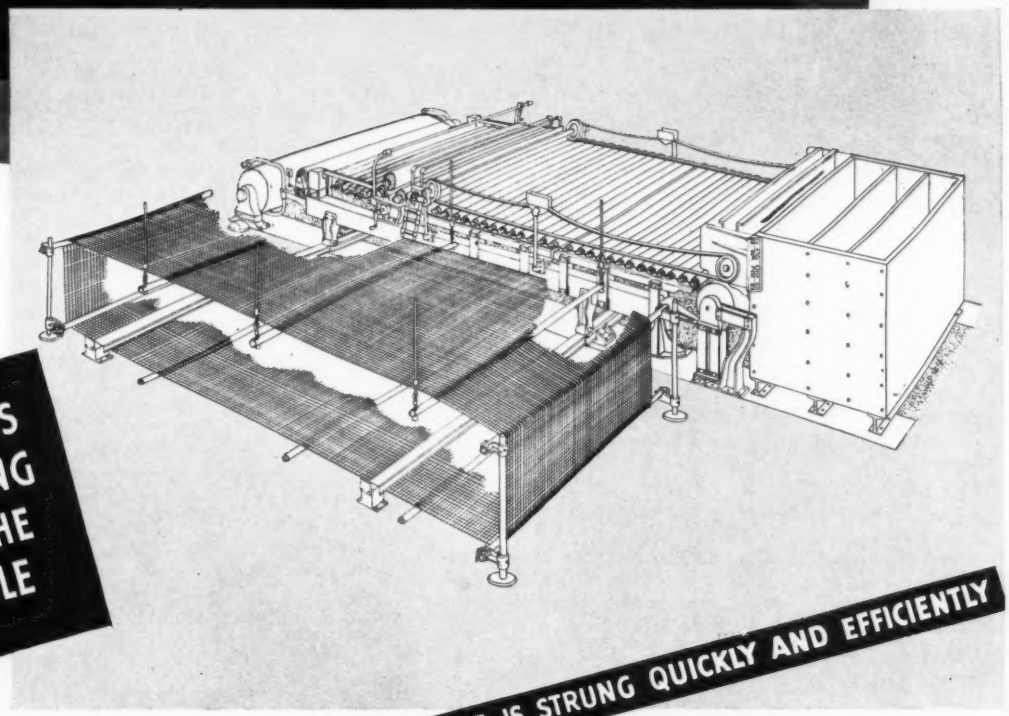

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1 Wire is strung in aisle while machine is in operation, if desired.
2 Fourdrinier pit can be washed out while wire is being installed.
3 Wire bundle is taken from shipping box and mounted directly in carriage—no chucks to apply—no further handling as bundle is unreeled as carriage moves along to form wire loop.
4 All wire poles are mounted in carriage before loop is formed. Inside poles are inserted inside the wire.
5 Safest—most convenient—quickest method of installing Fourdrinier wire.

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from all corners of the earth in a matter of seconds. Magazines are edited in New York and printed a few hours later in Chicago, thanks to the medium of the teletype. Photographs are sent by wire or by air. Hitler speaks to the German Reichstag on Sunday afternoon. That evening, the papers have a photograph of the event for page one. The Japanese sack another city in China. A picture of their triumphal entry dated the day AFTER the paper is published is flashed to American papers. It's no fake either, although perhaps I should remind you that we are a day behind the Orient in time.

In the old days when news was likely to arrive via a four-masted schooner, there wasn't quite the incentive to get it into print in such a hurry. A day or two more didn't make much difference. But the pace of newsgathering set today can brook no delay from the pressroom. It gets no delay. Not long ago, I read of a paper which had an extra on the street four minutes after the event had occurred.

Schedules by Air

The Crowell Publishing Company has announced that they will inaugurate a private airline to ply between New York and their plant at Springfield, Ohio. New fast printing schedules at Crowell will not be held up when mail or train schedules are too slow. These greater speeds in the Graphic Arts are not confined to publication printing. Many of the same methods which have been applied to step up the rate in this field, are being used to speed the production of bags, labels, packages, and containers of all kinds.

The new instant-drying, vaporizing printing methods make it possible to feed printed container sheets directly from the press to fabricating machines. The old drying wait is eliminated and packages are turned out at record speeds in a continuous production line. Tin and metal decorating have been speeded up. New inks that dry faster and improved lithographing equipment are bringing schedules to this field that would be considered just something to hope for only a year or two ago.

Whether we like it or not, to compete in this age of graphic arts miracles is to accept new standards of speed and quality which change at a dizzying pace. Only the far-sighted can hope to survive.

Speed Selling

This brings me to another phase of my talk. *Selling Speed* demands *Speed Selling*. How is this to be done? Not by making the salesmen walk faster. Not even asking them to make more calls on more people. It's really simpler than that, and it's infinitely more practical.

The answer is multiple salesmanship. A more familiar name for this method of Speed Selling is "printed salesmanship." It is the most effective way of reaching more people more times. "Printed salesmanship" doesn't describe it adequately. Multiple salesmanship is personal salesmanship multiplied many times. It throws into your sales army an advance guard of thousands of printed sales arguments. It brings you a rear guard of printed sales holders.

Effective oral salesmanship is more effective when it is coordinated with printed salesmanship. Theodore Roosevelt said that 90 per cent of being right is being right in time. With multiple salesmanship, your sales story can be kept before your customers nearly ALL the time.

What Speed Selling Demands

Modern speed selling demands fast, strategic moves which preempt markets swiftly and surely. Markets change too rapidly today to risk slow and static sales methods. Speed selling demands things like this:

1. Better trained salesmen
2. Closer supervision of salesmen
3. More cooperation with salesmen
4. More effective sales promotional material
5. Better printed salesmanship to prepare prospects for personal calls
6. More attention to cultivation of prospects between salesmen's calls
7. Thorough coverage of every influential factor in a sale—surround the account

How much of this can printed salesmanship contribute to multiple salesmanship? Through its many types of media, it can help the personal sales force in these ways.

1. Furnish carefully prepared, accurate descriptions of new products and processes.
2. Put in salesman's hands practically prepared sales talks.
3. Furnish prepared sales presentations to insure uniform and tested selling methods.

Saving the Salesman

These sales aids save the salesman's time by preparing the way for his call. They cover prospects too small for the salesman to contact himself. They save him from making routine visits. They save his correspondence time. They make sure that the customer gets accurate information. They corroborate what the salesman can say personally; they add force to his arguments by repetition. In short, they save the salesman for the all important job that is his alone—closing the sale.

Like the familiar situation in Alice in Wonderland, things are so geared today that "it takes all the running you can do to keep in the same place. If you want to get somewhere, you must run at least twice as fast as that."

You can't make your salesmen work twice as hard, unless they are lying down on the job. (I hope that yours aren't doing that.) But you can double their effectiveness by giving them allies that never take a vacation and never stop working. Printed salesmanship is the most efficient method of multiplying your personal salesmanship. It is the answer to today's need for Speed Selling.

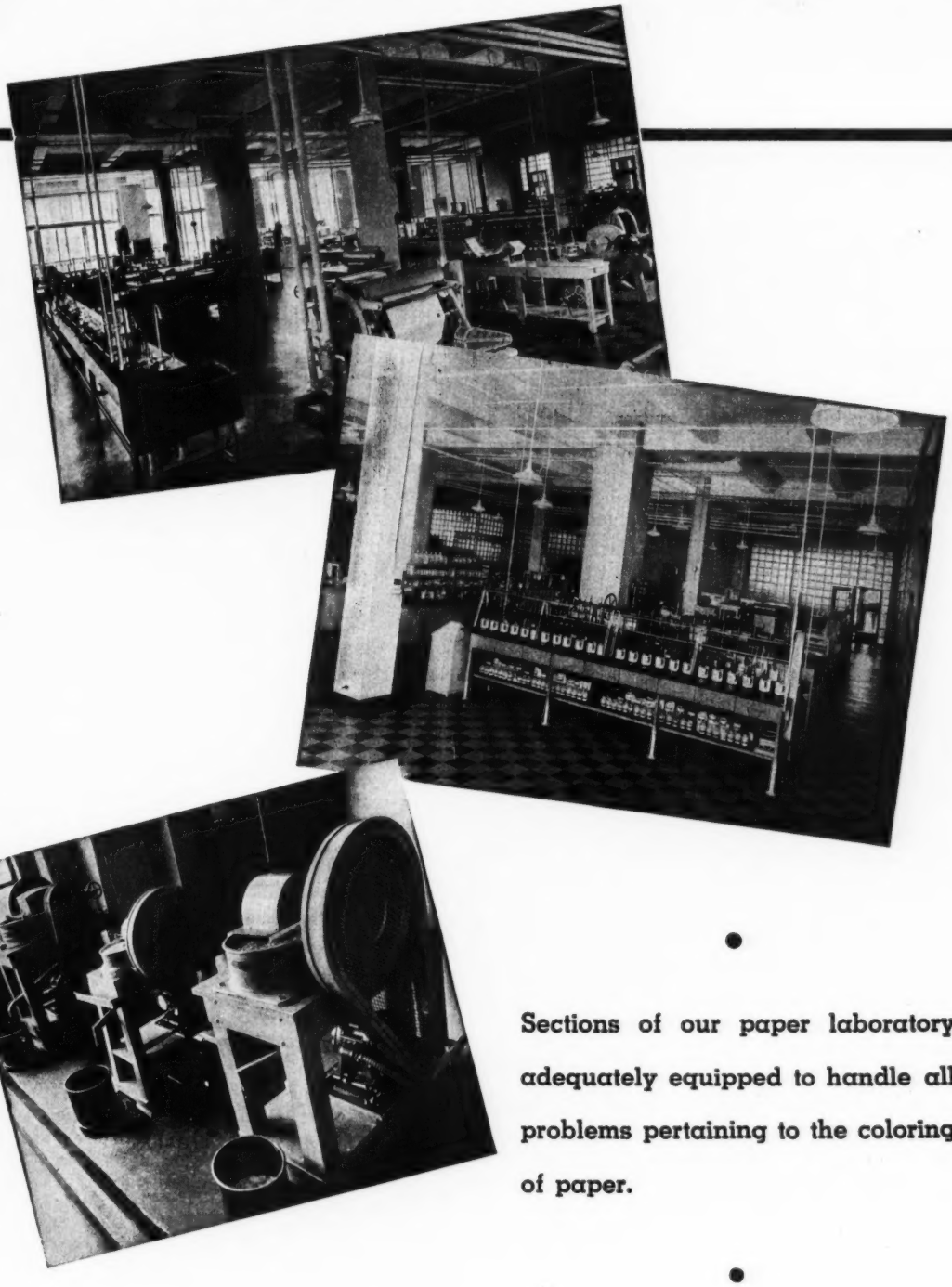
Selling speed has no patience with "stay-put" methods. It asks for the best today. It demands the impossible tomorrow. To all of us it says, "Reach for the moon . . . or reach for your hat!"

Following Mr. Welp's talk, Dr. Emil Heuser presented the TAPPI Medal to Dr. C. B. Thorne, who thanked the Association in a brief tribute to the technical men. Dr. Heuser's address is printed in full elsewhere in this issue.

Import Committee Report

The following report of the Import Committee of the American Paper Industry was presented by Warren B. Bullock, manager:

Since the announcement by the State Department of plans for the negotiation of reciprocal trade agreements with the United Kingdom and Canada, the Import Committee's staff and counsel have been devoting intensive study to the preparation of briefs in defense of the present rates of duty on the papers which are listed for consideration in these agreements.



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This task, important as it is, however, has not been allowed to interfere with the Import Committee's uninterrupted efforts to check unfair foreign competition, in which it has been so successful during all the fourteen years of its existence. Within the last few days a case affecting the dutiability of groundwood papers was tried before the United States Court of Customs and Patent Appeals. Other such duties have been carried on, despite the serious problem faced in combatting any reduction of duties in the pending reciprocal agreements.

If the papers listed for consideration in the Canadian and British agreements are finally subjected to duty revision, the entire tariff schedule as enacted by the Tariff Act of 1930 will have been rewritten. Hardly any major grade of paper will have escaped the pruning knife of the State Department. The situation is the most serious since the reciprocity agreement twenty-five years ago presented the United States Newsprint Industry to Canada.

In combatting reductions in the duties on papers, the Paper Industry has been faced with the strangest situation in American tariff history.

Tariff laws have been written by Congress, since the first days of the republic. The enactment of the Reciprocal Trade Agreement Act, however, gave to the Secretary of State the power to revise all customs duties as he may see fit, subject only to the limitation, that no duty can be reduced more than 50 percent of the rates fixed in the Act of 1930. There is no recourse to Congress from any action he may take.

Without questioning motives, or the high principles which have been announced as the basic principles upon which these agreements are being made, it is a fact that this one-man tariff revision is in the hands of one who has always been a low tariff advocate and who was such an advocate when still a member of Congress.

In the face of the threatened reduction of tariff rates, the American Paper Industry has done its best to prevent unjust tariff reductions by demonstrating the damage which such agreements will do to the industry. Briefs have been prepared by the Import Committee and filed in the name of the American Paper and Pulp Association on every pending reciprocal trade agreement in which paper might be a factor.

Despite these briefs and the oral appearances by prominent paper manufacturers at the hearings on these trade agreements, severe reductions have been made in many vital portions of the tariff schedule. Wrapping paper for instance, was reduced in the Swedish agreement, and the Finnish agreement still further reduced the duty on kraft.

The British and the Canadian agreements, however, definitely indicate a possibility of reductions in the parts of the Tariff Act where the damage to the paper industry would be greater, through tariff reduction, than in any other part of the entire schedule, except the wrapping which has already been subjected to reduction.

The British agreement lists the fine papers as among those on which duty reductions may be made. The Canadian agreement lists book and other printing papers, and all tissue papers valued at not more than 15 cents per pound. Other items of lesser importance appear in the announcement of each proposed agreement.

Briefs have just been completed by the Import Committee and filed in Washington opposing duty reductions on the items listed for consideration in the British agreement, and plans are complete for oral representations by prominent paper manufacturers the open hearings being on March 14.

The brief on the Canadian agreement must be filed before March 12, and oral hearings will begin April 4.

Inasmuch as any duty reductions accomplished through these agreements would apply, not only to the country with which the agreement is written, but with practically every other nation in the world, the Import Committee will welcome any suggestions that can be made by paper manufacturers which will assist in making our arguments against duty reductions so telling that such reductions may be prevented.

Paper and Twine Club Dines

The First Annual Seance, as the announcement described the annual dinner, of the Paper and Twine Club was held at the Starlight Roof of the Waldorf-Astoria on Wednesday, February 23. Broadway entertainers, including Johnny Johnson's orchestra, the Condos Brothers, the 3 X Sisters, and Abbott & Costello, provided the floor show for this gala triumph at which about 600 persons were present.

Jack Wittock, president, made the only serious statement of the evening, saying that the club had 508 members the day Convention Week started, had 568 members on the night of this dinner, and expected 600 before Convention Week terminated. Special recognition was then tendered Charles C. Walden, Jr. for his splendid work in securing a majority of the newly added members.

The introduction to the menu adeptly points out the significance of the association: "So varied are the interests of manufacturers, converters and merchants of paper, paper products and twine, that we often forget we're a big, important industry, with a unified purpose. The Paper and Twine Club provides all of you with the meeting ground you need. It's organized frankly for fun, hoping you'll all get better acquainted. But it also maintains a central office for the exchange of ideas and information which you'll find valuable if you will use it." The slogan is, "Support mills that support merchants."

A feature was the presentation to the lucky-number holders of prizes contributed by the following: Gaylord Bag & Paper Company, a radio; Testing Machines, Incorporated, a micrometer; United States Envelope Company, a box of stationery.

A surprise of the evening was the presence of candid camera specialists for *Life* magazine, who took photographs for "Life Goes to the Party," probably desiring to prove the statement of *Life's* companion publication, *Fortune*, made in its October, 1937, issue that "the paper industry is a cockeyed industry."

Institute of Paper Chemistry

The Institute of Paper Chemistry's board of trustees held one of its regular meetings at the Barclay Hotel February 21. The February meeting is always held in conjunction with Paper Week. The annual meeting was held last September when the following trustees and officers were elected for the ensuing year.

Trustees: President of the board, Ernst Mahler vice-president, D. C., Everest, D. K. Brown, Ernst Behrend, George Mead, Stuart Kay, Rex Hovey,

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The staff of the Institute, growing continuously, now totals 88, the most recent appointment being that of Doctor Emil Heuser. The budget for the current fiscal year exceeds $300,000 and additions to equipment have been made and more are contemplated.

The days of Thursday and Friday, May 19-20, were set for the Third Annual Conference for the chief executives of member mills. Eight years ago this month the first students were admitted to the Institute, although the Institute had been formed in the fall of 1929. At that time its membership was comprised entirely of Wisconsin mills. Today it is completely national in scope, having as members 62 different corporations which operate nearly 300 different plants. The plants are located in 28 states and represent roughly 40 per cent of the total production. The students have been drawn from nearly every state in the Union and graduates are widely distributed. At the dinner held for former students attending the TAPPI meetings, 23 were present.

Paper Mill Supplies Dealers Meet

The New York Association of Dealers in Paper Mill Supplies, Inc., convened in the East Ballroom of the Hotel Commodore for its thirtieth annual banquet on Wednesday evening, February 23. As usual, the great many persons who attended the affair enjoyed the excellent dinner and gala entertainment presented. The following companies had tables especially reserved for them:—

Ace Baling Wire Company; Atlantic By-Products Corporation; D. Benedetto, Inc.; Robert Blank; A. Bloch & Company; Charles J. Browne; Cantasano Brothers, Inc.; James Carrano's Sons, Incorporated.

Darmstadt, Scott & Courtney; Derrico Company; Economy Baler Company; A. W. Fenton & Company; James T. Flannery Company; Gaccione Brothers & Company, Inc., Genovese, Vito Trading Company.

Giove Company, Incorporated; H. Goldman Company; Gottlieb, Louis & Brothers; W. J. Green; Charles M. Haskins; Daniel M. Hicks, Incorporated; E. J. Keller Company; Loumar Textile By-Products, Incorporated.

Geo. W. Millar & Company, Inc.; A. J. Moran & Company, Inc.; New England Waste Company; Prospect St. Paper Stock Company, Inc.; George Reed; H. Rosenberg & Company; James Rosenberg; William Steck & Company, Inc.

Sterling Mill Supply Company, Inc.; Toga Paper Stock Company, Inc.; Valva Paper Stock Company; Whaling Waste Products Company, Inc.; Walker, Goulard & Plehn, Inc.

Paper Makers Advertising Association

At the meeting of the Paper Makers Advertising Club held at the Waldorf-Astoria Monday, February 21, the following officers were elected: President, Floyd Triggs, Riegel Paper Corporation; eastern vice-president, Edson Dunbar; western vice-president, R. S. Colvin; treasurer, M. A. Park, Marvellum Company; secretary, Richard Faulkner, International Paper Company.

The name of the organization was changed to the Paper Makers Advertising Association as more clearly descriptive of the functions of the association as a clearing house for information among its members, as well as its primary purpose of cooperative advertising of mill brand papers. Initiation fees and annual dues were abolished.

The annual report and address was given by Orin Summerville, Becket Paper Company. The speakers on a variety of topics of using mill brand papers, etc., were Williard Wheeler, N. W. Ayer & Son, Philadelphia; W. W. White, James White Paper Company; Oswald Marquardt, Marquardt Paper Company; Jack Martin, John P. Carlson Ink Company, Irving Simon, Macfadden Publications, and John Coakley, Thomas A. Edison, Inc.

The Association's publication, *Direct Advertising*, will be improved with a special concealed spiral binding with the next issue. This and other improvements were developed by Brand Stephens who has been the editor since its inception in 1916.

Wrapping Di[illegible]. of Tissue Association

The Wrapping Tissue Division of the Tissue Association held its meeting on Monday, February 21, at the Waldorf-Astoria. Discussion centered around four main topics: (1) Chairman Howard Larsen reviewed the past year's work of the division; (2) After a review of the Wrapping Tissue Guaranteed Label program, a further program of promotional effort was referred to the executive committee for recommendation; (3) A large section of the meeting was devoted to a discussion of the problem of small orders. A program was adopted; (4) In a review on the statistical program, it was pointed out 85 per cent of the industry's tonnage was represented in the reports issued.

The following were elected:—Chairman, W. E. McIntyre, McIntyre Brothers Paper Company; co-chairman, Arthur Duggan, Consolidated Water Power and Paper Company; secretary, Harold A. Edlund; committee members, H. R. Telfer, of Detroit Sulphite Pulp and Paper Company, Sam Lopin, of Mazer Paper Mills, and Howard Larsen, of Crystal Tissue Company. The chairman, co-chairman, and committee members comprise the executive committee.

Interfold Tissue Association

At the meeting of the Interfold Tissue Association, a division of the Tissue Association, held on Monday, February 21, 1938, the following were elected: Harold A. Edlund, secretary; Roger Bell; A. P. W. Paper Company, chairman; Grafton Houston, Fort Howard Paper Company, co-chairman. The chairman of the division automatically becomes a member of the board of governors of the Tissue Association.

The executive committee was also elected. This includes the chairman and co-chairman, as well as the following: Robert J. Black, Morgan Paper Company; C. A. Wagner, Stevens & Thompson Paper Company; Wayne Browne, National Paper Products Company; and Bert Reider, Victoria Paper Company.

Trade customs and standards were reviewed, and a standard committee consisting of Wayne Brown, Henry Wintgens and Bert Reider, was appointed by Mr. Wagner who was the presiding officer of the meeting.

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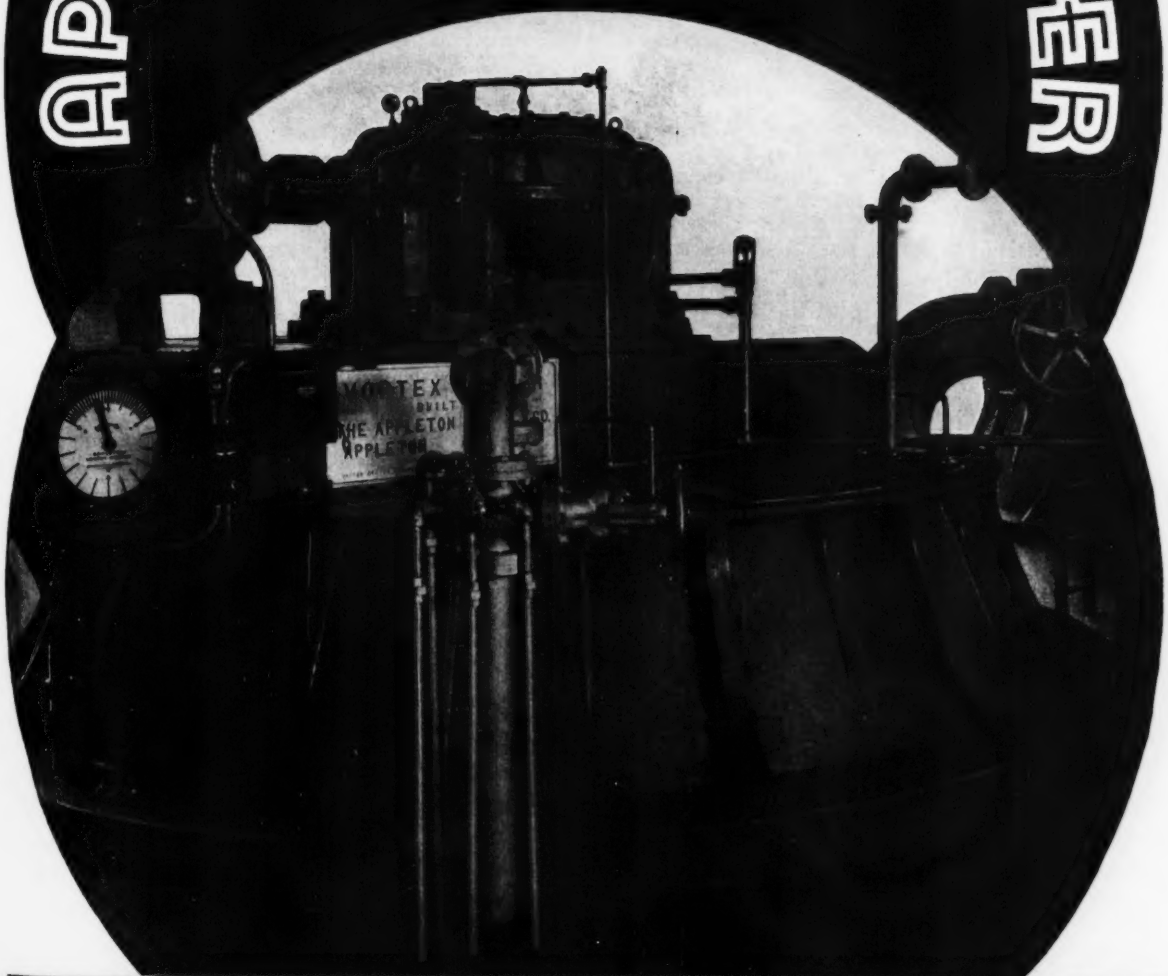

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Tissue Association

At the annual meeting of the Tissue Association held on Wednesday, February 23, at the Waldorf-Astoria, the following officers were elected: President, C. Alfred Wagner; vice-presidents, George Stuhr and Frank Vaughn; treasurer, Benjamin F. Picola; secretary, Harold A. Edlund.

The following were elected to the Board of Governors: Milan Boex, Northern Paper Mills; Grafton Houston, Fort Howard Paper Company; Joel Hartmann, Barclay Tissue Corporation; Samuel Lopin, Mazer Paper Mills; Howard Larsen, Crystal Tissue Company; Benjamin F. Picola, Gotham Tissue Corporation; George Stuhr, Southern Kraft Corporation; C. Alfred Wagner, Stevens & Thompson Paper Company; Frank Vaughn, Bay West Paper Company.

The new sectional chairmen, elected at the different meetings during convention week, also become members of the board: Robert Fairburn, Berst-Forster-Dixfield Company; Bert Reider, Victoria Paper Mills; W. E. McIntyre, McIntyre Brothers Paper Company; Henry Wintgens, Hoberg Paper & Fibre Company; Roger Bell, A.P.W. Paper Company.

Specialty Paper and Board Affiliates

The various groups of the Specialty Paper and Board Affiliates held their meetings from Tuesday through Thursday, February 22 to 24 inclusive, at the Waldorf-Astoria. The following were elected as chairmen of their respective divisions:

Bogus Bristol group, Samuel Sutphin, Beveridge Paper Company; Mill group, Walter Sheehan, Missisquoi Paper Company; Buff and White Silk Board group, Paul R. Bachman, Riegel Paper Corporation; Specialty Papers for Industrial Users group, Louis E. Vose, Hollingsworth & Vose Company; Tag Board group, W. A. Gamble, Brownville Board Company; Filling Board group, Paul R. Bachman.

The officers will be elected in March, at which time the newly elected chairmen are scheduled to meet. The present heads are: President, Louis E. Vose; vice-president, Paul R. Bachman; secretary-treasurer, Benjamin A. Franklin, 95 State street, Springfield, Mass.

Kraft Paper Association

William H. Anders, president of the Nashua River Paper Company, was re-elected president of the Kraft Paper Association at the annual meeting held on Wednesday, February 23, and Norman S. Stone, general manager of the Mosinee Paper Mills Company, was re-elected vice president. The executive committee includes these two officers and J. M. Arndt of the Gaylord Container Corporation, J. A. Auchter of the Nekoosa-Edwards Paper Company; D. P. Brown of the Brown Company; J. H. Cowhill of the Tomahawk Kraft Paper Company; H. S. Daniels of the Union Bag and Paper Corporation, E. R. Gay of the St. Regis Paper Company, W. J. Henry of the Southern Advance Bag and Paper Company, R. A. McDonald of the Crown Zellerbach Corporation; J. R. Miller of the West Virginia Pulp and Paper Company, and J. L. Stille of the Southern Kraft Corporation. S. M. Hudson is secretary-treasurer of the association.

The meeting heard report of the developments of the past year including a graphical presentation based upon comparison of statistical data for 1937 with previous years and with other industries. They then formulated plans for the activities of the new year. The business meeting was followed by an informal group luncheon of the members.

Sulphite Paper Association

The annual meeting and luncheon of the Sulphite Paper Manufacturers Association was held on Monday, February 21, at the Waldorf-Astoria. All the officers and the board of governors were reelected because of the splendid work they accomplished last year.

The officers are: General chairman, H. O. Nichols, Crown Willamette Paper Company; vice-chairman, Unbleached Group, George Stuhr, Southern Kraft Corporation; vice-chairman, Bleached Group, Rufus I. Worrell, Mead Sales Company; vice-chairman, Manilas Group, Rufus L. Sisson, Jr., Racquette River Paper Company; vice-chairman, M. G. Sulphite Group, Edgar W. Kiefer, Port Huron Sulphite and Paper Company. Thomas J. Burke is secretary-treasurer.

The following were elected to the Board of Governors in addition to the officers named above:

John E. Alexander, Nekoosa Edwards Paper Company; Aubrey Crabtree, Fraser Paper Ltd.; Walter B. Merlin, Hollingsworth & Whitney Company; John Stevens, Jr., Marathon Paper Mills Company; L. F. Porter, Northwest Paper Company.

Association of Newsprint Mfrs.

Chairman, A. L. Hobson, St. Croix Paper Company and vice-chairman J. D. Zellerbach, Crown Zellerbach Corporation were reelected at the annual meeting of the Association of Newsprint Manufacturers of the United States, which was held on Wednesday, February 23, at the Waldorf-Astoria. Samuel Pruyn, formerly a member of the Advisory Committee (1937) was elected to succeed C. K. Blandin as vice-chairman. R. S. Kellogg is the secretary.

The Advisory Committee members are:—E. L. Crooker, International Paper Company; John H. Smith, Hawley Pulp and Paper Company; Harold S. Smith, Maine Seaboard Paper Company and R. H. M. Robinson, Minnesota and Ontario Paper Company. John H. Smith was the newly elected member of the Advisory Committee and the other members were reelected.

Roll Toilet Division of Tissue Association

The Roll Toilet division of the Tissue Association held its meeting on Tuesday, February 22, at the Waldorf-Astoria. H. G. Wintgens, of the Hoberg Paper Company, presided. Standards and trade customs were reviewed, and were referred to a committee. The consensus of the group was that the mills would continue their policy of accepting business for thirty-day shipment only.

The plans proposed to introduce model marking and labelling laws into State legislatures to cover toilet tissue, were discussed.

The following were elected: Chairman, Bert Reider, Victoria Paper Mills, who automatically becomes a member of the board of governors of the Tissue Association; co-chairman, Wayne Brown, National Paper Products Company, executive committee including Milan Boex, of Northern Paper Mills; C. A.

Wagner, of Stevens & Thompson Paper Company; I. Wood; G. Houston, Fort Howard Paper Company; S. Wishnick, Park Tissue Mills; S. Lopin, Mazer Paper Mills; B. Picola, Gotham Tissue Company; A. Ginsburg, M. A. King Company.

Paper Towel Association

The Association of Paper Towel Manufacturers elected its executive committee at the annual meeting held on Wednesday, February 23, at the Waldorf-Astoria. Henry Wintgens, Hoberg Paper Mills, was elected chairman.

The other members of the committee are: Jack Leo, Brown Company; George Stuhr, Southern Kraft Corporation; Wayne A. Brown, National Paper Products Company; W. F. Campbell, Scott Paper Company.

Samuel Lopin, Mazer Paper Mills; W. M. Watson, Wortendyke Manufacturing Company; Harold Peazey, Peazey Paper Products Company; Frank Vaughn, Bay West Paper Company; A. J. Marcuse, West Disinfecting Company.

Harold A. Edlund, 19 West 44th street, New York, is the organization's secretary.

Glassine Bag Association

Two meetings of the Glassine Bag Association were held on Tuesday, February 22, at the Waldorf-Astoria. A. B. Kehr, Paramount Paper Products Company, is president of the association, and Harold Guiteras serves the organization as secretary. Officers of the Window Bag Group are Wm. Gainsberg, president and H. G. Guiteras, secretary, both of whom have held these offices for several years.

Directors named were: Arthur W. Frank, American Paper Goods Company; Gerald Fox, Oneida Paper Products Company; Gordon Friend, T. M. Royal Company; Fred Zorn, Custom Made Bag Company, and James Duffy, Union Bag and Paper Corporation.

Discussion on trade customs was featured with many suggestions for improvements in the glassine bag industry being adopted.

Gummed Industries Association

The general industry meeting and luncheon of the Gummed Industries Association was held Thursday, February 24, at the Waldorf-Astoria. The following officers were elected for the ensuing year: President, Henry W. Stork, Rexford Paper Company, Milwaukee, Wis.; vice-president, R. A. Maish, Dennison Manufacturing Company Framingham, Mass.

The new executive committee includes the above officers and the following: John MacLaurin, McLaurin-Jones Company, Brookfield, Mass.; J. R. Carter, Nashua Gummed & Coated Paper Company, Nashua, N. H.; Joe Mazer Hudson Bag Company, New York City; W. K. Gerbick, Central Paper Company, Menasha, Wis.; Irving McHenry, Mid-States Gummed Paper Company, Chicago, Ill.

Millinery and Notion Bag Association

The Millinery and Notion Bag Manufacturers Association, a division of the Paper Bag Manufacturers Institute, held an unofficial get-together at the Waldorf-Astoria on Wednesday, February 23.

The Association already held its annual meeting on January 12. 1938, at which time the following were elected: C. H. Kimball, president; L. J. Doyle, vice-president; J. A. Kavanagh, treasurer; L. F. Foster, secretary. The executive committee consists of: Alfred Bleyer, Alfred Bleyer and Company; H. O. Nichols, Crown-Willammette Paper Company; G. A. Weisberger, Equitable Paper Company; A. Rabin, Schorsch & Co.; J. M. Hartmann, Southern Kraft Corporation; L. J. Doyle, Union Bag and Paper Corporation; Wm. P. Brockermann, Jr., Wolf Brothers.

Writing Paper Manufacturers Assn.

At the 77th Annual Meeting of the Writing Paper Manufacturers Association, at the Waldorf-Astoria, February 22 and 23, R. S. Madden was re-elected president and M. C. Dobrow, executive secretary-treasurer. The executive committee consists of: R. S. Madden chairman and president; H. R. Baldwin; A. C. Gilbert; H. H. Hanson; H. F. Harrison; G. P. Lee; H. A. Legge; L. E. Maglathlin; F. Savage; W. C. Wing, Jr.; and J. D. Zink.

Executive committee, Rag Content Paper Group: A. C. Gilbert, chairman; H. H. Hanson; L. E. Maglathlin; W. C. Wing, Jr.; and J. D. Zink.

Executive Committee, Sulphite Bond Group: G. P. Lee, chairman; H. R. Baldwin; H. F. Harrison; H. A. Legge; and F. H. Savage.

Cardboard Association

The Cardboard Manufacturers Association met on Wednesday, February 23, at the Waldorf-Astoria. A list of those elected is presented herewith: President, John Van Horn, Holyoke Card and Paper Company; vice-president, Malcolm Lowe, Lowe Paper Company; secretary-treasurer, James L. Ritchie; chairman of Coated Blanks group, Joseph Moses, Falulah Paper Company; chairman of Coated Tag group, Fred Heinritz, Appleton Coated Paper Company; chairman, Coated Boxboard group, Donald Lowe, Lowe Paper Company; chairman, Photomount group, Herman Harrigan, District of Columbia Paper Company.

Cover Paper Manufacturers Association

The Cover Paper Manufacturers Association at its Annual Meeting, at the Waldorf-Astoria, Tuesday, February 22, accepted the invitation of the Writing Paper Manufacturers Association to become a group of that Association.

The following Cover Paper Executive Committee was re-elected: G. H. Beckett, Chairman; A. E. Frampton; F. E. May; D. T. Quirk; W. J. Warner.

Under the consolidation plan, G. H. Beckett, as chairman of the Cover Paper Executive Committee, was elected a member of the Executive Committee of the Writing Paper Manufacturers Association.

Glassine and Greaseproof Association

The Glassine and Greaseproof Association held its annual meeting at the Waldorf-Astoria, February 23. Olaf Henderson was chairman of the nominating committee and the following were elected:

Chairman, P. E. Hodgdon. Executive Committee: Folke Becker, Rhinelander Paper Company; Paul E. Hodgdon, Deerfield Glassine Paper Company; Harry B. Kuhns, Nicolet Paper Corporation; Paul F. Moore, Westfield River Paper Company; Robert F. Nelson, Glassine Paper Company; and John L. Riegel, Riegel Paper Corporation. Secretary, Thomas J. Burke, 122 East 42d street, New York.

Paper Salesmen Hold Record Meeting

The annual meeting of the Salesmen's Association of the Paper Industry was held at the Waldorf-Astoria on Tuesday, February 22. The officers elected for the current year were as follows:

President, J. T. Burruss, Albermarle Paper Manufacturing Company, Chicago.

Vice-President Eastern Division, Hugh Phillips, International Paper Company, New York.

Vice-President Western Division, John R. Diggs, Mosinee Paper Mills Company, Chicago.

Secretary-Treasurer, Dr. E. O. Merchant, 122 East 42nd street, New York.

RECORD ATTENDANCE AT LUNCHEON

The attendance at the 19th annual luncheon of the Salesmen's Association of the Paper Industry, held in the grand ballroom of the Waldorf-Astoria Tuesday afternoon, broke all previous records with over 1200 present. E. R. Lyman, of the Missisquoi Corporation, New York, the retiring president served as chairman.

Seated at the speakers' table were the following: D. Clark Everest, president; C. W. Boyce, executive secretary; and Carl E. Whitney, counsel, of the American Paper and Pulp Association; E. R. Lyman, president; John T. Burruss, western vice-president; and Hugh N. Phillips, eastern vice-president of the Salesmen's Association of the Paper Industry; A. E. Cadman, secretary of the Canadian Pulp and Paper Association; General Hugh S. Johnson, and Dr. E. O. Merchant, secretary of the association.

E. R. Lyman, chairman, in his introductory address said in part: "This is the 61st Annual Convention of the American Paper and Pulp Association. It probably will go down in history as one of the biggest and best. We wish time permitted our introducing to you all those who are sacrificing their time, using their efforts and laboring for the good of this industry. The various chairmen and presidents of the divisional organizations under the National Trade Association, its president, Ben Tracy, TAPPI, The Paper and Twine Club, the divisional presidents and chairmen of the groups of the American Paper and Pulp Association, the board of governors and secretaries. It is a pleasure to introduce to you now those at this table who are now going to speak.

"We seem to be fortunate again this year, as in the past, to have the president of the American Paper and Pulp Association with us. Last year his own words were: 'I used to feel like a kid in this industry, but suddenly awoke to realize I was one of the deans'. It is easy to remember when he started for it was the beginning of this century, 38 years ago. We are glad to welcome you Mr. Everest."

D. C. Everest Speaks

The address of D. C. Everest, president of the American Paper and Pulp Association, on Sound Salesmanship, the Key to this Industry's Future, follows:

"I am very happy to have this opportunity to extend to the Sellers of Paper a word of welcome on behalf of the American Paper and Pulp Association. I think few people realize how much your Association has contributed to the welfare of the Paper Business since its organization. You have done more to simplify and to stabilize the distribution of Paper and Paper Products than any other agency.

"During the last ten years we have been going through a series of economic, political and legislative gymnastics never before known in this country. The rules of the game have been changed from day to day. Management has had so many new fangled ideas thrust upon it, that it has welcomed the opportunity to dump into your laps those things which have to do with the sale and distribution of its products.

"I have often thought of your situation in all this complicated mess of the last few years. I have heard much wild talk about government taking over industry. In some quarters I have heard how Labor would take over certain industries—a great hulabaloo about Labor, Capital and Management. No one seemed to think about sales and distribution. You were "the forgotten men." These people who would seize industry have no more conception of your function in industry than 'the man in the moon.' They seem to think that all one has to do is to provide capital, labor and factory management to produce goods and the problem is solved. I agree that all these are absolutely necessary to any business but I also contend that selling and distributing are even more important factors. Brick, mortar and machinery, money and men can get nowhere except some "live wires" are pounding the railroads, highways and sidewalks of this country getting the orders on which to operate these plants. People still have to be 'sold' the product of any plant. Through highly developed technical skill in the manufacture of machinery and in plant operation, there is but small variation in cost of production of like grades in the majority of plants in our Industry, but the difference between the fellow who invariably sells that product at a price below his competitor and one who does a selling job at a decent price is the difference between the vandal and the builder. The success or failure of any corporation lies in the merchandising end of the business.

"Through your association work and particularly your close contact with users of Papers, I think you have improved the sales end of this Industry tremendously.

"A few years ago one of our distinguished guests coined, or at least strongly emphasized the word 'chiseler.'

"I feel that in this Industry we have better than the customary 85 per cent of decent citizens, and *if* we have 10 to 15 per cent of 'chiselers,' it is due to the fact that they have refused to join your organization. 'Chiselers,' as a rule, never join in any Association work. No one, with any degree of intelligence or decency, could long associate with this organization without becoming a better citizen and a better salesman.

"You have been beset with all sorts of restrictive measures, some of which no one could interpret. You may have more of these. There is no use expecting miracles in the way of help from governmental or other agencies. Self help is the best help.

"From now on, our hope lies in going ahead on a common sense basis, endeavoring to extend our business through new uses and maintaining presently established uses. Stick to your divisional associations. Things move faster today than ever before, and if there was ever a time when you needed the factual data provided by these associations it is now. You

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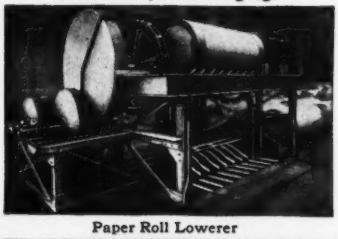
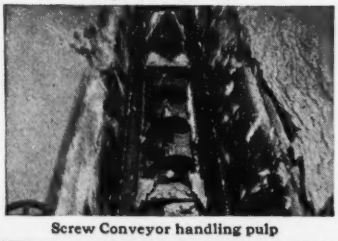


Paper Roll Lowerer

● The pulp and paper industry has long known through actual use that Link-Belt cost-reducing mechanical handling and power transmitting equipment is durable, dependable, and economical, being built to last, and to operate at maximum efficiency. Send for General Catalog No. 700.

Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices located in principal cities.

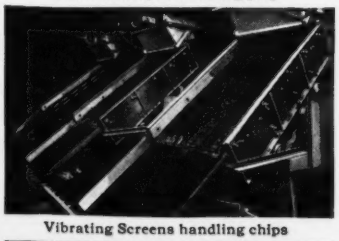
7184-F



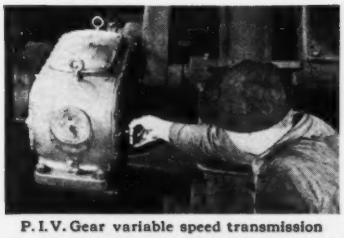
Screw Conveyor handling pulp

Silverstreak Silent Chain Drive

Self-Aligning Belt Conveyor Idler



Vibrating Screens handling chips

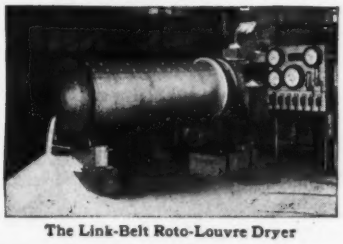


P. I. V. Gear variable speed transmission

Bearings, Collars, Hangers, Pulleys, Take-ups

Speed Reducer and Chain Drive

Belt Conveyor handling chips



The Link-Belt Roto-Louvre Dryer

have had a recent demonstration of how quickly things can happen, and yet careful study of statistics in each of the Divisional Associations indicated a downward trend long before purchasers shut off the spigot completely. There is one thing evident to me, and that is, given satisfactory assurance from Washington that industry will be accorded a 'decent living condition,' this situation can change for the better as quickly as it skidded down hill a few months ago.

"The things we once regarded as fundamental for good business are with us. Relieved of any more restrictive legislation, and with a little silence and some confidence, industry can go ahead and employ people and get out of this mess.

"If this is not done, it is evident we have a tough time ahead of us for several months. It will require greater skill than ever before to handle the sales and distribution of our products if this Industry is to fulfil its destiny. Operating ratio will probably be low. You will be pushed to get business. Our price structures have been fair, based on a much higher rate of operation than we can now expect. Price-cutting will not encourage the use of one additional pound of Paper.

"With the members of your organization rests the success of this industry for 1938. I have faith in your ability to handle the situation in a sensible and effective manner."

In his address introducing General Hugh N. Johnson, Mr. Lyman said in part: "There is something to this Association beyond the holding of this Annual Luncheon or the luncheons that are held in Chicago and New York each week. It is a serious force that is helping to direct the destinies of the paper manufacturing industry. From it more constructive information is passed through the channels of our great industry than from any other individual source. It is made up of salesmen who are always on the firing line. These same salesmen, the members of this organization, every one of them, are the sponsors of this great luncheon today. There are those among us here who will say, in answer to this: 'I came to hear General Johnson; General Johnson, Lyman, is your drawing card today', and in answer I will say. 'You bet he is, but the salesmen of this Association had the incentive, the vision, the courage, the initiative to ask General Johnson to come, and of course they are grateful to him for so doing. He is for such an organization I know, for in his inimitable manner he told me so'.

"Our organization has labored under its original articles of association with hardly an amendment. Its original president, George Gibson, is still just as enthusiastic over its affairs today as he was in 1920 when serving in that capacity. Since, he conceived and has published the Fourth Edition of the A to Z Directory, alphabetically listing the members and member mills. This directory is given to every new member and is kept revised for every member. Mr. Gibson is here today.

"The Association has accomplishments: it has progressed in its nineteen years of continuous service; it has the distinguished salesmen of the industry in its Association. It conceived and built up the Import Committee, one of the most valuable assets of the American Paper and Pulp Association; it has held divisional associations together. It has operated on a code of ethics that have been most valuable to every member and member mill. It has made better salesmen, better men and a better industry.

"Pawnee Bill led the great race of pioneers over the plains of Oklahoma in 1889. Just a few years later another lad did almost the same thing. That lad was the first Oklahoman to graduate from West Point. Later he received his Phi Beta Kappa Key from the University of California. He was the lad who ran three and had something to do with all the following: The Selective Draft, the Liberty Loan Campaigns, the Food Administration, the War Industries Board Mobilization of Industry in 1917-1918, and the National Recovery Act of 1933. It is with great pleasure I introduce General Hugh Johnson."

General Hugh S. Johnson Speaks

"I am glad to be asked to speak to a branch of the Paper Industry. I know a little about paper. I was once a director in one of its companies. But that isn't the main reason. This was one of the most faithful industries to the Blue Eagle of the old N.R.A. 'Love me, love my bird.'

"I loved him too, but if I could call my old Blue Hawk fluttering back tomorrow from the grave where he was laid by a sick chicken, I wouldn't do it. He was a war bird—a creation of a great emergency. He was never intended to be anything but a temporary expedient. In the panic of 1932 when business, big and little, was rushing to Washington asking for a dictator, N.R.A. was the very mildest of the plans proposed to try to bring back some confidence and order out of storm and chaos.

"If it did no more in those troubled times, it did that. We have heard a great deal recently about big and little business and the lack of cooperation between business and the government. I don't remember hearing anything of that kind then. The President got on the radio one evening and asked all employers to agree with him to shorten hours and raise wages. There wasn't any crack-down or compulsion about that. It was merely a request. Within a few days, 97½ per cent of employers had signed those agreements. They had increased payrolls by three billion dollars and made nearly 3,000,000 new jobs. They had wiped out child labor in a week and accepted the principle of collective bargaining. It was the greatest cooperative effort in the country's history.

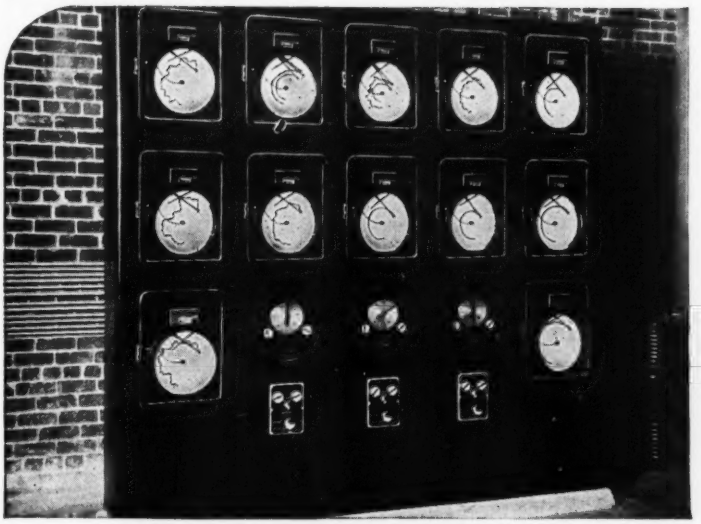
"Some of that gain was later lost. But there was one gain that it took a long time to lose. It was the confidence within all business, that acting together and with government—not as enemies but as partners—there is almost nothing they cannot do. There is still nothing they cannot do. But to do anything in a Democracy you have got to go about it as it was gone about in those early days of N.R.A.—in mutual sympathy, as a vast cooperation—and not as a Kilkenny cat-fight.

"There isn't anything new about this conclusion. Recently it is not too much to say that business and government have been at war. In war, nobody ever wins—everybody loses. Everybody has been losing ever since this bad feeling between business and government began and everybody is losing still.

"There is no profit in talking about how the fight started and who is to blame for it. There is plenty to blame on both sides. That isn't the point. The point is to recognize that it is an intolerable situation in which no recovery can come and the quicker we get back to some half-way ground of cooperation the better it will be for everybody in this country—workers, farmers, the unemployed, business and the government itself.

"This is a business country if by business you

KCA INSURES CONTINUOUS STEAM ECONOMY



This Bailey Meter distribution panel installed at Kraft Corporation of America, includes recording and integrating meters for Steam Flow; to turbine, from turbine bleed, to reducing valves, to digester, to evaporator, to feed water heater, to pulp dryer, to causticizing, and to auxiliary header, as well as Pressure Reducing and Desuperheat Controllers.

New Mill at Fernandina, Florida, Safeguards Operating Economy with Bailey Distribution Meters and Bailey Meter Control of Combustion, Feed Water, Steam Pressure Reducing and Desuperheat

Kraft Corporation of America has insured continuous economy in both the generation and the utilization of steam in its new Fernandina mill.

Steam pressure, fuel economy and furnace draft are automatically maintained by the Bailey Combustion Control System. Operation is entirely automatic, regardless of variations in the proportion of bark to oil burned by the 100,000 lb. per hour capacity, 615 lb. pressure power boiler.

BaileyThree-Element Feed Water Control maintains the desired boiler drum water level and regulates water input to equal steam output at all times.

Process steam is automatically conditioned by two Bailey Pressure Reducing stations and by a Bailey Desuperheat Control System.

Write for diagrams showing recent installations of meters and control in pulp and paper mills.

BAILEY METERS

BAILEY METER COMPANY
1056 IVANHOE ROAD • CLEVELAND, OHIO
Bailey Meter Company Limited, Montreal, Canada

BAILEY METER CONTROL

The Complete Combustion Control System

BOILER METERS • MULTI-POINTER GAGES • FLUID METERS • RECORDERS • SUPERHEAT CONTROL • DESUPERHEAT CONTROL • COMBUSTION CONTROL • FEED WATER CONTROL

mean exchanging goods and services in the hope of making a reasonable profit and keeping a reasonable part of it. That principle made this country and peopled a continental wilderness. It can save what it made and it is the only principle that can do it.

"There is here every facility for making such a system work—130,000,000 people all of whom could use and enjoy more than they have. With one-third of them ill-housed, ill-fed and ill-clothed, most of them could use much more. Here also are all the raw materials from which to give plenty to all of them. Here are the best facilities man ever saw to manufacture and distribute plenty—including vast crowds of idle but efficient labor hungry for employment. Here also are more available money and potential credit to finance a greater transaction and turnover than ever has been known in this or any other country.

"Now, these things are the ingredients of unlimited prosperity—a vast demand, a potentially unlimited supply, a mammoth provision of credit and money. They are all that are needed. Yet the machine stands stalled, millions are unemployed, profits are fading. Everything is paralyzed by uncertainty. Nobody knows what is hovering just around the corner. What is the matter? It is a mystery—a magic—a black magic.

"And yet is it so impenetrable a mystery after all? You can look into your own hearts. You can ask 100 people who are responsible for operating a business or for using money, either to lend, spend or invest. Just ask yourself or them why they don't get busy and manufacture, or employ or lend or spend or invest. You will get the same answer in nine cases out of ten. 'We don't know what is going to happen because we do not know what government is going to do.'

"Except in the Army it takes two people to cooperate. I knew an enthusiastic new 2nd Lieutenant who reported to a gruff old army captain and liked him, 'Ah, Captain,' he said, 'this is fine. We will cooperate perfectly.' 'Yes,' said the old plainsman, 'and you'll do all the cooperating.' That seems to be the present philosophy of government.

"It is true that it is not so much what government has done as what it has said or threatened which has halted business—although it has done plenty. A year ago business was getting better—almost to the 1929 level of industrial production. Profits were beginning to reappear—in some lines, very large profits. Government hadn't done much. That wasn't the point. The point was that government had insisted on the power to do almost anything it wanted to do. It began to threaten to use that power, and to ask for more power to do other things.

"In that single paragraph lies the answer to all the black magic and the mystery of why the greatest prosperity engine in history—all tuned up, oiled, fuelled and ready to go—sputters and stalls and simply refuses to start humming and hitting on all 12 cylinders.

"Perhaps a better way to put it is that the engine is all ready to go, except that it hasn't any spark-plug.

"The spark-plug of our system—of any capitalist system—is the hope of every one of our active toilers who support 130,000,000 people, that by working hard in competition with his fellows, he can get ahead without too much interference and better himself and the condition of his dependents.

"That's all. That's what makes the wheels go 'round. That was the incentive that has built this country. To the very extent that you take that away or put hobbles on it, the wheels will go around less fast. Open the way for the breadwinners of 130,000,000 people all to be getting as busy as ants on that incentive, and you have unloosed the most powerful force for production and prosperity in the world. Take any part of that incentive away and you slow the system. The more you take, the slower it will go.

"Make no mistake about this. In the complexities of modern civilization, you must take part of it away. In the first place, the principle 'nobody is going to starve in this country' is beyond argument. The day is gone when people who cannot make it go in one place can put the family in a covered wagon and move to some place else and start over again on free land. In the second place, some business units have become so big that they exercise as much economic power over daily living as many governments. It doesn't reside in the heart of a democracy that such public power shall not be at all subject to the public will. These vast units must be regulated in the public protection not to say what they shall do, but clearly and effectively to say what they shall not do.

"This much every intelligent business man who has kept himself abreast of his times must recognize and whole-heartedly support.

"But it is a very far cry from saying this to saying that, because of these necessities, government must move in not merely to say what business shall not do but to say also what it shall do. That is not regulation, that is operation. When government begins to operate business, the tremendous force of the active operators among 130,000,000 people dwindles to the one force of government operation.

"The profits motive among 26,000,000 workers, acting with the utmost independence consistent with modern civilization, activates our economy through hope of reward—greed if you like, or ambition—the strongest of human propellers. When government begins to operate business as it does in Communist and Fascist systems you substitute—as a human incentive for the hope of reward, the fear of punishment.

"For the hope of reward and advancement, men give everything they have to give. They cudgel their wits. They burn the midnight oil. They produce the maximum of human effort.

"When the incentive is only the fear of punishment men, like prisoners on a chain-gang, give grudgingly the least they can get by with—and escape the lash.

"The difference between the production of the two impelling forces is immeasurable—perhaps 50%, perhaps 75%—perhaps very much more.

"Now I do not say, or for a moment imply, that we have yet gone to any Communist or Fascist system. I merely say that to the extent that government goes toward the operation rather than the minimum necessary regulation of business, it tends in that direction. To the extent it tends in that direction, it tends to slow up our economic engine which should be producing at its maximum right now. And, finally, I mean to charge that, in its attitude toward business, government has already gone far in that direction. It has taken certain controls which permit it to go much further. It is seeking additional controls that could take it all the way in that direction.

Salute to Success

IT has been our privilege as the designing and supervising engineers for the Chesapeake-Camp Corporation's new plant at Franklin, Virginia, to have had some part in the finished pulp and paper mill as it stands today. We are proud to have been associated with this work.

J. E. SIRRINE & COMPANY

Engineers

GREENVILLE SOUTH CAROLINA

"Our extravagant present system of wholesale spending lays too heavy a burden on producers to carry non-producers. A worker earning less than $1000 a year pays 20% of it in hidden taxes. Larger producers are almost prohibited from gain above certain levels. Individuals are discouraged from investing large amounts at large risks for large gains to bring in new industries. Corporations are prevented from investing profits for the same purposes. These are clogs on production. You weigh a racehorse too heavily in a handicap and he will sulk or not run at all. That is what happened to the great Sarazen. It finally got so he turned around and ran the other way. Something like that is happening in this country now.

"That general governmental tendency and attitude plus threats that emphasize that attitude and extend that tendency, are the reasons why we are not now going full steam ahead. All of this gets me back to my starting point—N.R.A. and the great 1933 corporation which were the very reverse of the present tendency.

"We have long had in this country a system called the anti-trust laws. The idea there is that business must never act as a unit—unlimited competition and the devil take the hindmost. Every individual operator, big or little, must work in a water-tight trade compartment. There can be no cooperation either among the units of a single industry or between business in that industry and government of any unit of that industry. 'Every *** combination *** in restraint of trade is unlawful.' That is what the law says without any modification or qualification whatever. Now of course that is perfectly and crazily absurd. Every contract for future performance is in restraint of trade. Every catalogue naming price is an offer to restrain trade. In the war, the government found it could not function unless it forced the whole business pattern into one vast combination to restrain trade. At the depths of the depression, we had to do the same thing. Even now when the President says he wants business to cooperate or do this or that, he knows, as he has said, that business is not a unit. It must go into some kind of convention even to be lectured.

"These laws being crazily ridiculous and absurd as written, the government had to read into them a word that isn't there—the word 'unreasonable.' It is only unreasonable combinations in restraint of trade that are unlawful. But who is to say what is reasonable? That depends on circumstances in each case. It is reasonable to kill a man if that is the only way to prevent him from killing you. But it is not reasonable to kill him if he is only picking daisies.

"Up to quite recently the government refused to say in advance what was reasonable. The only way to find out was to go and do it. It is like the man on the chain gang who didn't know whether there was a guard behind the tree. The only way he could find out was to start to run and he did—and found out. If you try and the government thinks it unreasonable, you can go to jail. Recently some gentlemen were convicted of a crime carrying a jail sentence for doing in combination what they thought was reasonable. They thought so because the government itself told them to do it. But Mr. Robert Jackson, our new Solicitor General, and a court which he admits he selected because it was biased, wouldn't let the jury consider that. That is some measure of the attitude of the present government toward business—which makes it so difficult for recovery to start. In milder moments some of its honeyed tongues say business is its sweetheart but in nearly all of its revealing activities, business is a big bum.

"Now, on this question of what business can't do, every other industrial country says, 'You can't use combined economic power to exploit the public. Combinations in restraint of trade are lawful if they are not contrary to the public interest.'

"The essence of N.R.A. was an attempt to apply that rule. The basic idea there was that all or any part of business could come to government and say 'This is what we want to do. Tell us if it is in the public interest. If you think it is, grant us a revocable license to do it. If it turns out wrong you can revoke or modify your license.' That was the basis of N.R.A. but although the statute authorized this, the Administration was never able to make up its mind whether this is what it meant or whether what it meant was the old anti-trust acts.

"People were threatened by both the Attorney General and the Federal Trade Commission for doing, under N.R.A., the precise things that they had been authorized to do over the President's signature. As soon as N.R.A. went out, some were actually prosecuted and convicted for doing those things.

"I am recalling this history to you not to revive old memories of N.R.A. but to illustrate my point that what is delaying recovery is nothing else in the world but the threats and repressions by government toward business.

"It is political palaver to say 'Oh, we don't mean little business. We only mean a few—a very few people in Big Business'—the 'Sixty Families' and such like. N.R.A. was killed by a partisan political assault, supposed to be to save the Little Fellow. I do not need to say much to this industry about that. As I recall, it would have taken about 50 of the biggest of your companies to control a majority of business in your industry. You were a whole codefull of little fellows. As I recall also, this was one of the many industries which earnestly protested the assassination of the Blue Eagle.

"The protests against that included practically every Little Fellow Trade Association in the country. Under N.R.A., business failures among Little Fellows went from the highest point to the lowest of which there is record. Not only did the slaughter end but we were able to call tens of thousands of independents back from the grave. Recent assaults on business, both vocal and statutory hurt the Little Fellow as hard or harder than the Big Fellow and every Little Fellow knows it. I have talked to scores of such meetings as this. I could have told Smooth Old Danny Roper when he got his 700 Little Fellows together just what he was going to get. Somebody called that meeting 'Snow White and the 700 dwarfs.'

"If the Administration didn't know before, that its restrictive attitude toward business was as bitterly resented by Little Business as by Big Business, the resolutions of that riotous meeting in their original form should have informed it.

"Why is there this uniformity of opinion? I'll tell you. Because the real attack is on the profits and capitalist system—on the idea of individual initiative—on everybody who has anything, in favor of anybody who has less. That hurts and threatens everybody in business, big or little, employer or employee. Both recent policy and recent talk and action are anti-business.

"This Administration went into office on a clear-cut program. It was going to keep the dollar sound,

Commercial Credit Company

Baltimore

Twenty Sixth Annual Consolidated Financial Report

AS OF DECEMBER 31, 1937

ASSETS

Cash		$ 28,077,827.23
Motor Lien Retail Time Sales Notes	$155,015,564.40	
Motor Lien Wholesale Notes and Acceptances	60,740,756.14	
Industrial Lien Retail Time Sales Notes	57,795,609.16	
Open Accounts, Notes and Factoring Receivables	33,893,956.19	307,445,885.89
Sundry Accounts and Notes Receivable		740,537.05
Customers' Liability on Foreign Drafts and Letters of Credit (Contra)		138,683.77
Repossessions in Companies' possession at depreciated values:		
Motor Cars	$ 145,112.22	
Other than Motor Cars	16,689.83	161,802.05
Investments:		
Sundry Marketable Securities at book value (market value $442,379.50)	$ 414,935.13	
Investment Securities held by American Credit Indemnity Company of New York, at market value	4,775,710.42	5,190,645.55
Deferred Charges:		
Interest and Discount Prepaid, etc.	$ 1,103,024.37	
Unamortized Debt Discount and Expense	820,288.00	1,923,312.37
Furniture and Fixtures		4.00
		$343,678,697.91

LIABILITIES

Unsecured Short Term Notes (Subsidiaries $6,496,155.88)		$171,786,655.88
Accounts Payable:		
Credit Balances of Manufacturers and Selling Agents held by Factoring Subsidiaries	$ 2,164,214.51	
Sundry, including Accruals, Federal and other Taxes	6,123,728.72	8,287,943.23
2¾% Debentures due 1942	$ 35,000,000.00	
3¼% Debentures due 1951	30,000,000.00	65,000,000.00
Contingent Liability on Foreign Drafts and Letters of Credit (Contra)		138,683.77
Contingent Reserves:		
Margin due Customers only when Receivables are collected.	$ 6,054,633.01	
Dealers' Participating Loss Reserves	6,268,432.59	12,323,065.60
Reserves for:		
Possible Losses and Contingencies	$ 5,226,991.37	
American Credit Indemnity Company of New York, Reserves required by Insurance Regulations, plus Voluntary Reserves of $500,000	1,122,606.64	
Deferred Income and Charges (unearned)	15,121,208.85	21,470,806.86
Capital Stock and Surplus:		
Minority Interests (Common Stock and Surplus—Subsidiaries)	$ 44,668.00	
Preferred Stock, $100 par value 499,646 shares authorized—121,948 shares outstanding designated as:		
4¼% Cumulative Convertible	12,194,800.00	
Common Stock, $10 par value:		
(3,000,000 shares authorized—1,840,900 full shares and 1,094 shares of fractional scrip outstanding)	18,419,940.00	
Capital Surplus	$17,964,493.87	
Earned Surplus	16,047,640.70	34,012,134.57
		64,671,542.57
		$343,678,697.91

Summary of Operations

	Year Ended Dec. 31, 1937
Gross Receivables Purchased	$933,854,331.85
Gross Operating Income	$ 33,966,634.46
Sundry Income	700,218.37
Gross Income	$ 34,666,852.83
Operating Expenses:	
Officers, Employes and Agents Salaries, Commissions and special compensation	7,426,642.70
Taxes (except Federal Income and Undistributed Profits)	787,025.19
Management Expenses	6,646,659.03
Reserves for Losses in Excess of Net Losses (Credit)	912,635.55
Net Income before Interest and Discount	$ 20,719,161.46
Interest and Discount Charges	3,781,604.71
Reserve for Federal Income Taxes	2,916,609.59
Net Income from Operations	$ 14,020,947.16
Less Net Income for Minority Interests	4,844.55
Net Income on Capital Stocks of Commercial Credit Company	$ 14,016,102.61
Reserve for Federal Surtax on Undistributed Profits	422,983.50
Net Income credited to Surplus	$ 13,593,119.11

	1937	1936
Interest and Discount Charges—Times Earned	5.47	8.50
After Federal Surtax on Undistributed Profits:		
Net Income per share on 4¼% Cumulative Convertible Preferred Stock outstanding at end of period	$111.46	$97.84
Dividend Requirements on 4¼% Cumulative Convertible Preferred Stock outstanding at end of period—Times earned	26.20	23.02
Net Income per share on Common Stock, including scrip, outstanding at end of period	$7.09	$6.07

Analysis of Earned Surplus

Net Income credited to Surplus	$ 13,593,119.11
Excess Reserves on closed banks returned to Earned Surplus	41,828.22
Total	$ 13,634,947.33
Less dividends paid in cash on:	
4¼% Cumulative Convertible Preferred Stock	518,752.87
Common Stock ($4 and $1.50 extra per share)	10,123,656.50
Transferred to reserve for depreciation of securities to market value (American Credit Indemnity Company of N. Y.)	374,424.38
Furniture and Fixtures written off	359,825.20
Total	$ 11,376,658.95
Net Surplus Credit for period	$ 2,258,288.38
Earned Surplus Balance, beginning of period	13,789,352.32
Earned Surplus Balance, end of period	$ 16,047,640.70

Commercial Credit Company conducts a highly specialized form of commercial banking through the purchase of receivables created by the sale of merchandise from the manufacturer to the consumer. It purchases current open accounts from manufacturers and wholesalers, who collect the accounts as usual, and limit their credit losses. Its subsidiaries, Textile Banking Company, Inc., and Edmund Wright Ginsberg Corporation, New York, offer "Factoring" service, under which they purchase and collect accounts, assuming all credit risk. Its subsidiary, American Credit Indemnity Company of New York offers "Credit Insurance" which reimburses credit losses in excess of an agreed percentage on annual sales, and guarantees specific accounts. The Company specializes in time payment financing of automobiles, refrigerators, heating equipment, radios, Diesel engines, time and labor saving machinery and other articles of a durable nature.

balance the budget by economy and reduce taxes. These are policies absolutely necessary to a free business economy. As far as busines was concerned directly, the attitude was entirely one of cooperation and sympathy as I have tried to show.

"On this policy, in the first five months of 1933 industrial production and reemployment took the biggest upward spurt in our history—nearly 70%. In early June, the Administration repudiated its solemn promises to pay its debt in gold. About that time it switched from an economy policy to a spending policy and began to talk about inflation and devaluing the dollar. These are all anti-business policies. They shocked the whole business and financial community and before the end of the year 60% of the gain was lost. From that time on, until 1937, the indexes did little more than to churn up and down.

"Then, with the overwhelming 1936 election, everybody expected a new era of good feeling in spite of the Madison Square Garden speech at the end of the campaign, which should have been a warning. Business started booming.

"Then, one by one, so rapidly as to make it certain that they had been all prepared in advance as part of a combined plan, came the legislative proposals of the first session of this Congress; the court-packing plan indicating that justice was to be unduly influenced by Third New Deal Executive wishes; the terrible original Black-Connery bill, which proposed to turn control of both business and labor over to what was sure to be a new Labor Relations Board; the Farm bill which proposed to regulate the croppage, storage and marketing on 6,000,000 farms; the Reorganization bill which tended much further toward one-man government than this country yet suspects; the 7 TVA's bill which tends to break down state lines and put both state and federal governments under one-man control. They were the separate parts of a jig-saw puzzle. Each in itself looked endurable, but when you put them together they made a pattern of one-man government entirely inimical to business.

"At the same time, the destruction of business expansion and independent operation, which resided in the new federal tax system on undistributed profits and capital gains, began to bear on both little and big business so heavily that they all at last realized the vicious anti-business aspects of those laws. They make the expansion of a small business or a new business virtually impossible.

"As business began for the first time to show real activity in a forward march in the Spring of 1937, the Administration began a direct assault on that progress. The advance in prices was condemned. A deliberate attempt to restrict credit was made by the Federal Reserve. Some Administration spokesmen began bitter oratorical assaults on business, and others, notably Mr. Henry Wallace and Mr. Mordecai Ezekiel, began to recommend that the complete governmental control which they had devised for agricultural production, marketing and storage, should also be applied to business as the next step in the program.

"Put all these things together and what do you get? I'll tell you what you get. You get an Administration which has not proposed or put into operation since N.R.A., one single policy, statute or action that is not anti-business—restrictive of the capitalist and profits system—not one single policy or action which does not tend toward the socialistic doctrine of government operation of business or what they call 'production for use and not for profit.' You get not one single action toward the encouragement of business but a whole cluster of actions which tend toward its paralysis. Coupled with this, you get an uninterrupted series of utterances revealing a bitter hostility—if not active hot hatred toward the profits system as such and the American business system in particular.

"Couple this unmistakable exposure of attitude with a continual grasping for more and more power over business. How can you avoid the suspicion that we are substituting the fear of punishment for the hope of reward as an incentive to activate prosperity? What happens to the spark-plug that has made our production engine go? It is fouled. It is no good. It has slowed our action 50% in a year and if it is not revised, we never will recover.

"Why is all this? How can such a thing be? How? Why? Why? How? I'll tell you. It is the political strategy of this group to change the old minority Democratic party to a new, permanent majority party of the discontents. It is the simple old demagogic formula of uniting the majority of those who have less against the minority of those who have more by the false promise that, by taking away from those who have to give to those who have not, prosperity will be restored.

"A new party is being built out of the submerged classes—negroes, unemployed, as many farmers as can be bribed by 'benefits' and as many workers as can be convinced that their interests and those of their employers are not the same.

"One way to do that is to batter and berate business and threaten, or at least suggest, government seizure and operation of the elements of production.

"It is a very persuasive theme. It has taken the Fascist and Communist countries. If it would work, who would stand against it? But we know it won't work because we know that it isn't working anywhere and never has worked anywhere in the history of the human race.

"It won't work because it does not put the normal human incentive of gain, independence and liberty behind the machinery of production. It won't work because if you divided up all existing wealth you wouldn't help anybody for more than a year and then you would paralyze everything.

"It is yearly production that makes jobs and livings—not accumulated wealth—and this threatened system paralyzes and is paralyzing production. The piteous sufferers of this paralysis are the very ones it is touted to benefit—negroes, unemployed, workers and farmers.

"With all that government could possibly do by taxing activity to a standstill, it might take ten billion in taxes for a year but it could not reemploy 3,000,000 extra people.

"On the other hand, if we could only raise our business activity from where it is now—probably 50 billions a year to where it should be—100 billions a year—it would make normal jobs for all our unemployed except the 3 or 4 millions who are always part-time or totally unemployed. That is the only possible solution of our unemployment problem. That is our only road to recovery.

"All that is necessary to do that is to step aside and let the American capitalist and profits system work—to do everything to encourage business and spending and investment, instead of doing everything to discourage and deter them—to reverse all these policies of distributing scarcity and poverty and start

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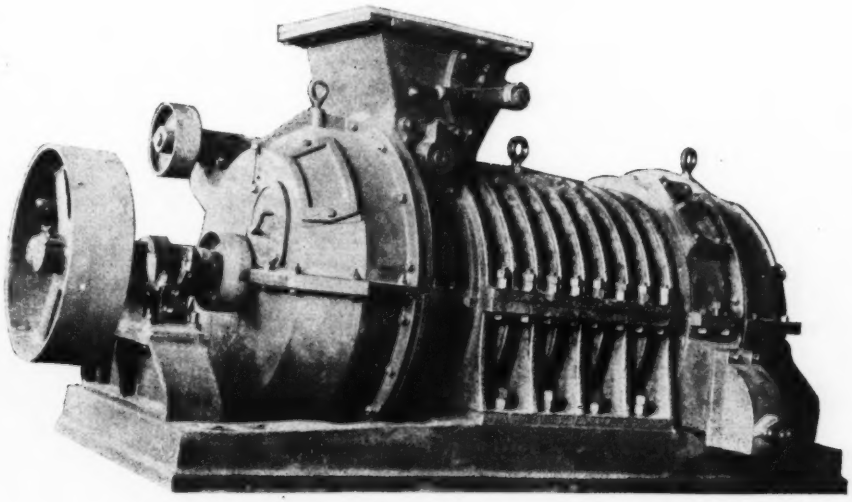

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everything we can think of to distribute abundance and wealth by throwing our system of profits and production into high gear.

"Specifically what?

"Under the anti-trust laws precisely define what it is that business cannot do and permit it to do under government supervision whatever will speed production and employment.

"Completely revise the tax system to provide maximum revenue until the budget is balanced and thereafter reduce taxation. But get that revenue by abolishing every tax which is not for revenue but for punishment and regulation. Fix rates on the law of diminishing returns, encouraging, instead of confiscating, investment for expansion for capital gains and for new industries.

"Take government clear out of any regulation by subsidized competition with private enterprises. If these are abused in any industry the government has ample power to regulate them. It has neither right nor duty to do this by competing.

"Prevent every unfair business practice or any that are harmful to the public interest but do this by singling out the particular harmful practice and malefactor. Do not do it by condemning business as a whole and holding it up to contempt. The only purpose in the present policy is a demagogic political intent of inciting class hatred to create a party of discontents. Just now the country needs every force within it cooperating to end this hateful season of depression and suffering.

"There are many more things that should be done but I am not here to state any five-point or nine-point or twenty-point program. They are both presumptuous and silly.

"All that is needed here is to make it clear that the policy of this government is to make our capitalist and profits system work by giving it freedom supervised in the public's interest and not to destroy it by beating and regulating it to death.

"A mere declaration of a new policy won't do the trick. There have been too many declarations and repudiations for any declaration to be believed. But declaration plus confirmatory action will do the trick and that is the greatest national need of this moment.

"All that is needed for recovery, without giving up a single one of its great social objectives, is for this government to decide whether it wants a capitalist system based on individual freedom and reasonable gain or some modification of a Socialist, Fascist or Communist system based on government operation of business by a bureaucratic overhead of inexperienced and second or third-rate minds. It can try either, but it can't try both at the same time. They are as contradictory as black and white."

EMMETT HAY NAYLOR RETIRES

Emmett Hay Naylor, who for twenty-four years has been secretary of both the Writing and Cover Paper Manufacturers Associations, has resigned to retire from active business as has been his expressed wish for several years, but has been dissuaded because of conditions in the industry. M. C. Dobrow, who has been with these associations for twenty-two years, was elected at the annual meeting on February 22 to succeed Mr. Naylor.

In 1914 Mr. Naylor became associated as secretary-treasurer with the Writing Paper Manufacturers Association, and has built it up from a small association to a large one. Not only is it the oldest trade association in the United States, having been founded in 1819, organized in 1861, but never developed as a real business association until 1914, but it is outstanding as one of the leading trade associations in the country, if not in size, at least in its completeness and service.

During the development of the Writing Paper Manufacturers Association, Mr. Naylor also organized and was secretary of the Tissue Paper Manufacturers Association for ten years, and of the previous Book Paper Manufacturers Association for five years, and the Stationery and Tablet Association for an equal length of time, but as the Writing Paper Manufacturers Association grew, he had to give up these other organizations to devote all his time to the writing and cover interests.

In 1920, appreciating the necessity of closer cooperation among trade associations in the United States and in advancement of this movement, he was one of five to organize the American Trade Association Executives, of which he was first president and for a long while a director. This organization now has over four hundred members, representing all the principal industries and trades in the country. The following year Mr. Naylor was also instrumental in organizing the Trade Association Executives in New York City, and was its first president, and is still upon its board of directors.

One of the first books on the value of trade associations was written by Mr. Naylor in 1918, but his outstanding work, which is still an authority—"Trade Associations—Their Organization and Management"—was produced in 1921, and is still a basic guide for many associations.

In 1923, at the request of Mr. Hoover, then Secretary of Commerce, he wrote a complete history of trade associations in America.

Mr. Naylor is not only the dean of all the secretaries in the paper industry, but of most of the trade association executives in the United States, among whom he has a host of intimate friends, There is no one who is better known and has any more friends among the manufacturers of all grades of paper and paper merchants in this country and Canada, and he will be seriously missed by all those who have benefitted from his gracious personality, rare ability and willingness at all times, without sparing himself, to be of help and service to any who have sought his assistance.

Mr. Naylor is retiring to his country place at Cummington, Mass., in the Berkshires.

U. S. Pulp Producers Association

At the annual meeting of the United States Pulp Producers Association, at the Waldorf-Astoria, Monday, February 21, the following officers were elected for the ensuing year: Amor Hollingsworth, president, Penobscot Chemical Fibre Company; vice-president, R. B. Wolf, general manager of the pulp division, Weyerhaeuser Timber Company, secretary-treasurer, O. M. Porter, 122 East 42nd street, New York.

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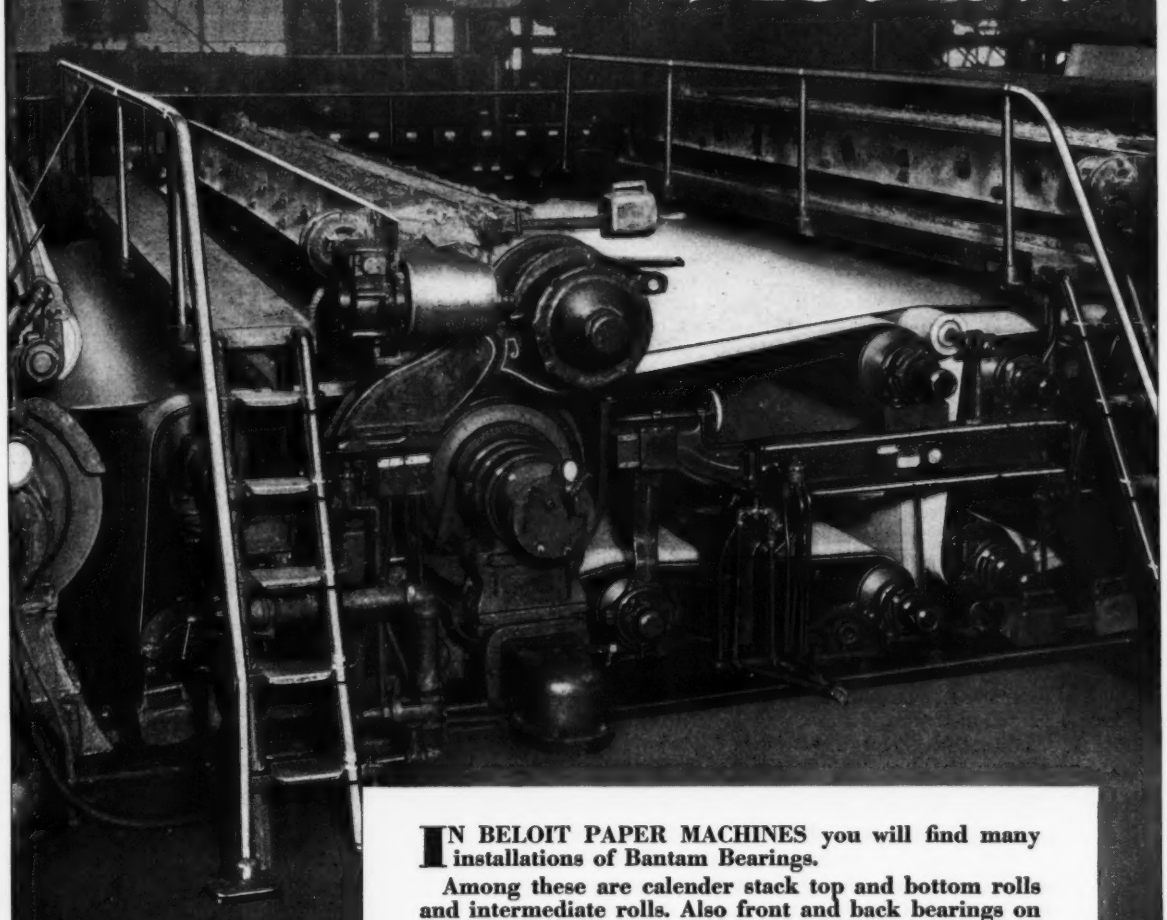

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Dr. C. B. Thorne Gets Medal for Outstanding Contribution to Technical Progress

Dr. C. B. Thorne, vice president of the Canadian International Paper Company, was presented at the annual luncheon of the Technical Association of the Pulp and Paper Industry at the Waldorf Astoria Hotel on Wednesday, with the TAPPI Gold Medal for his outstanding contribution to the technical progress of the pulp and paper industry. The presentation address which follows was made by Dr. Emil Heuser, himself a widely known member of the technical branch of the pulp and paper industry and now a member of the faculty of the Institute of Paper Chemistry at Madison, Wis.:—

The Gold Medal of the Technical Association of the Pulp and Paper Industry is according to its statutes awarded to those whose achievements have definitely contributed to the technical progress of the paper and pulp Industry. Thus far the award has been made to six outstanding men in our Industry, to William Mason and to Ogden Minton in 1928, to Ernst Mahler in 1933, to Edwin Sutermeister in 1935, and to Dr. Clarence West in 1937.

Today this medal will be given to Dr. C. B. Thorne, vice-president of the Canadian International Paper Company, and the honor of presenting Dr. Thorne with the award has fallen to me. I would like you to know how much I appreciate this honor and also the opportunity of reviewing on this occasion a part of the history of pulp manufacture with which Dr. C. B. Thorne's name will forever be connected.

Born in Moss, Norway

Dr. Thorne was born in Moss in Norway, but obtained the greater part of his college education in Germany, at the Technical Universities of Hanover and Dresden. In 1902 he came to the United States for the purpose of studying American methods of pulp and paper manufacture. After a short orienting activity as an engineer in New York he visited most of the mills in the Eastern United States and one year from his arrival joined the Riordon Pulp and Paper Company in Hawkesbury, Ont. The late Charles Riordon, well known to us as a pioneer in the field of pulp manufacture, was president of this company which also operated another mill at Merritton, Ont.

It did not take Charles Riordon long to realize the unusual abilities, the energy and initiative of the young Norwegian engineer and to see that he was well advised in giving him full opportunity of action.

In 1903 the sulphite pulp industry in Canada was still rather young and naturally far from the high level it has reached today, after a development of 35 years. Equipment and operation at that early time, measured by today's standards, were rather primitive and uneconomical. It soon appeared that Dr. Thorne, in his capacity as a technically educated man, had arrived at a most opportune time to assist greatly in operating the two mills of the company under improved technical and economical conditions.

In the elimination of the numerous shortcomings and the rebuilding of almost the whole Hawkesbury mill, Dr. Thorne found a rich field, and the success he achieved is indicated by the fact that he, at the age of only 27 years, was entrusted with the management of the Hawkesbury mill and later of the Merritton mill.

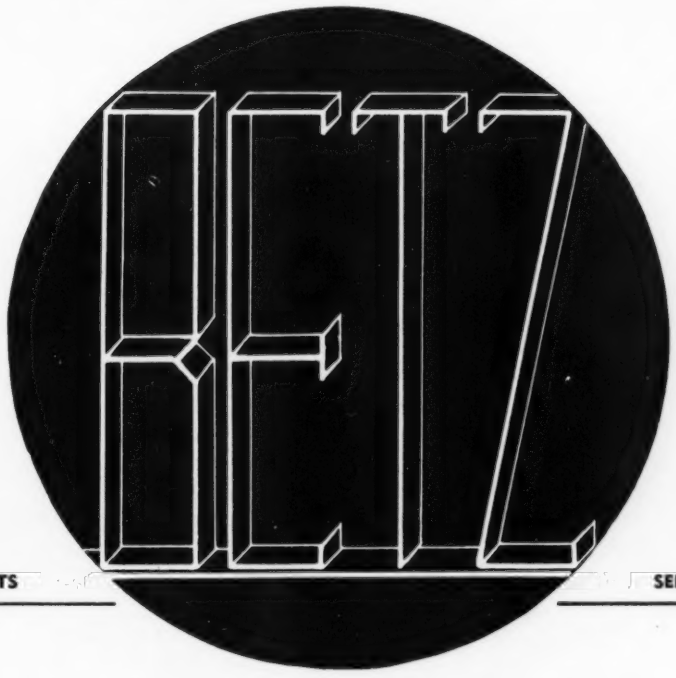
It may be inserted here that the cooperation between Dr. Thorne and Mr. Charles Riordon, adorned by a common interest in the cultural side of life, developed into a fine friendship which broke up only with the passing of Mr. Riordon in 1932.

Reduction in Waste of Sulphur

Of the many accomplishments with which Dr. C. B. Thorne's name is connected we may mention only a few. They are those which made history. Much

DR. C. B. THORNE
Awarded TAPPI Medal at Annual Meeting

DR. EMIL HEUSER
Presents TAPPI Medal at Annual Meeting



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WRITE FOR YOUR COPY OF: (1) STOPPING CARRYOVER IN FIVE HOURS; (2) THQ METHOD OF SULFATE DETERMINATION; (3) THE BETZ INDICATOR—A MONTHLY; (4) LIST OF AVAILABLE LITERATURE.

time was devoted to the reduction of the enormous waste of sulphur, and Dr. Thorne's endeavors led to a then new sulphur dioxide recovery system, a system which was gradually adopted and further developed by other Canadian and American mills.

In 1912 Dr. Thorne conceived the idea of replacing the old wooden acid towers by re-enforced concrete construction and erected the first concrete acid tower at the Hawkesbury mill. These towers, now known as "Jenssen Acid Towers," were soon generally accepted by sulphite mills all over the world.

One of the next problems to attract his attention was wood preparation. The American method of piling unbarked wood appeared rather unsatisfactory. From his early experience in European pulp mills Dr. Thorne was familiar with the Scandinavian and German practice of peeling the logs in the forest and of thus securing conditions under which a process of seasoning, resulting in a more uniform moisture content, could proceed much more satisfactorily than in logs which were allowed to keep their bark until only shortly before they were subjected to chipping. But the more specific problem was how the logs could be peeled in the yard in order to ensure most proper seasoning and how they could immediately afterwards be piled and stacked in a practical way. In those days only the wasteful knife barkers were in use. Studies in various directions led Dr. Thorne to the construction of his log barking machine. This machine applied a principle which was new at that time. Actually it derived from observations he had made on the movements of logs when under the influence of a water current. The machine reproduces the action observed, the mechanism causing the logs, placed in a chute, to rotate and thus, by rubbing against one and another's surfaces and under the influence of water, to loosen their bark.

Built to Bark Logs of 16-foot Length

The log barking machine was first built for 4-foot logs, but to pile logs of this length was impractical since they would not stack well. The next step therefore was to change the machine so that it would bark logs of 16-foot length. The easiest way to bark the logs was found in passing them through the machine as soon as they are taken out of the water, and piling them in about the same way as we pile lumber.

Up to 1913 the production of sulphite pulp of the Merritton and the Hawkesbury mills was sold in the unbleached state. But due to the increasing demand for bleached sulphite the Merritton mill was equipped with a bleachery which was of a design usual at that time. Bleaching was carried out in a simple one-stage process in Hollanders. To this was added an electrolytic plant for the production of bleach liquor. How attractive such a proposition must have been at that time is revealed when we learn that soon after the beginning of the World War, which meant the cessation of imports from European countries and an ever increasing scarcity of chlorine in U. S. and Canada, the price for bleached sulphite pulp went up to far above $100.00 per ton and continued climbing after the war, in 1919 and 1920 reaching a high of $250.00 per ton. In view of the success of the Merritton mill it was deemed advisable also to equip the Hawkesbury plant with a bleachery. But here, due to the development in the production and transportation of liquid chlorine, bleach liquor was prepared from bought chlorine and milk of lime.

Bleached Sulphite in Other Fields

The introduction of bleaching into the two mills gave Dr. Thorne an excellent opportunity for devoting his attention to this phase of manufacture and he soon envisioned the possibilities which bleached sulphite pulp might have in other fields besides that of paper. It was a time when the artificial silk industry was realizing more and more the usefulness of wood pulp and the economic advantages of substituting this for cotton linters. While there were quite a number of people who were convinced that the manufacture of rayon from wood pulp would be only a passing episode, Dr. Thorne felt that the rayon industry, somewhat subdued during the years of the Great War, would soon recover and develop an ever increasing demand for suitable wood pulp material.

At that time very little was known about the essential requirements of bleached sulphite pulp for rayon manufacture, and the limited knowledge the rayon manufacturers might have had themselves being on items essential to the manufacture of a suitable and uniform thread were kept in secrecy and thus were hardly accessible to the Pulp Manufacturer. All the latter was given to understand was that his pulp had to be free of even traces of metal impurities, had to have a low copper number and a high alpha cellulose content. But what this content actually ought to be was a matter of much diversified opinion, likely due to the lack of a standardized method. Quite often the requirements were not specific enough and often they were even rather fantastic.

Large Mill Exclusively for Rayon Pulp

However, to Dr. Thorne these difficulties and shortcomings, which revealed themselves to him as the result of years of careful inquiry and investigation, meant little. His idea to devote a new large mill exclusively to the manufacture of rayon pulp had taken shape and nothing could prevent him from putting his idea into practice. He did it with the energy, foresight and initiative he had shown on previous occasions. He selected the site of the new mill at the foot of Lake Temiskeming, Quebec, in the Upper Ottawa Valley, with excellent conditions for the development of hydroelectric power, for the transportation of wood to the mill, and with a source of mill water of greatest purity. In designing it Dr. Thorne made use not only of the best engineering practice available at that time but also of the valuable special experience he had gained during the many years of his activities for Merritton and Hawkesbury.

Construction of the Kipawa mill, under his indefatigable personal direction, started in 1918. Included in it were particularly the 16-foot barking machine with log seasoning in the yard, the concrete acid towers and the recovery system. On account of the necessity of handling the 16-foot logs the wood room had to be designed differently from the usual layout. Besides, a pretty little town was built, surrounded by wooded hills and overlooking Lake Temiskaming.

In December, 1919, the first pulp was produced and the manufacture of rayon pulp in this mill was inaugurated late in 1920. Before this time the Hawkesbury mill, in the course of special development work, had sold a certain amount of its bleached sulphite to a large American rayon manufacturing concern. The result was the lesson that much remained to be learned—a new impetus for Dr. Thorne to find ways and means of improving the product.

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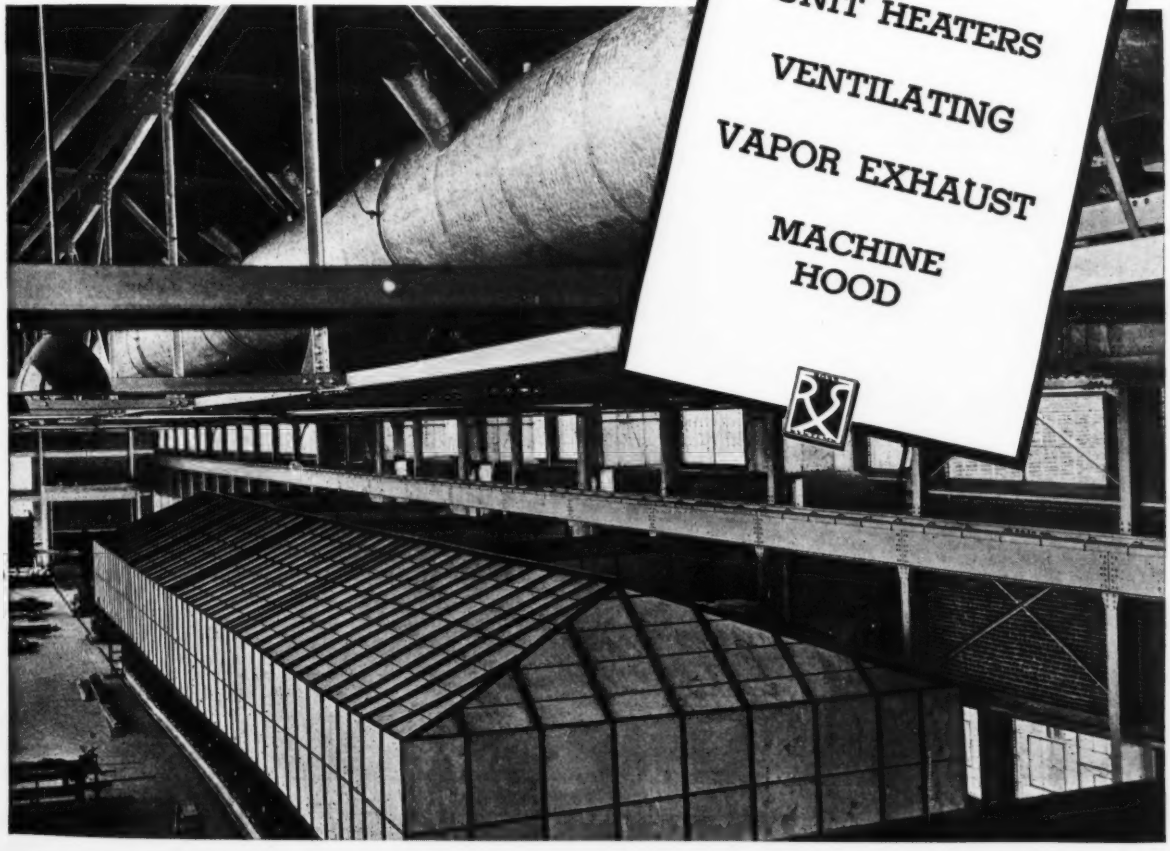

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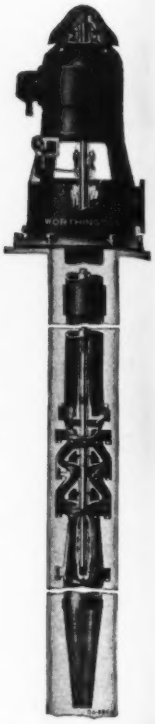

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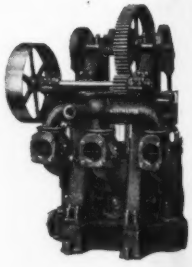

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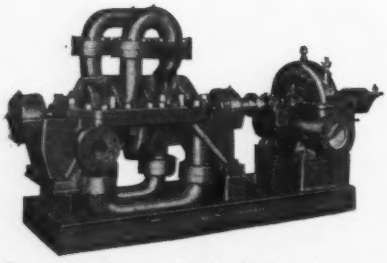
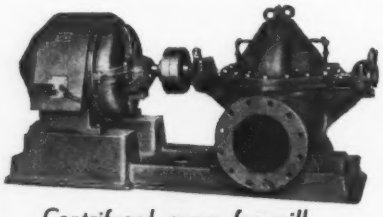


Centrifugal pump for boiler feed service



Centrifugal pump for mill supply and general service

Monobloc centrifugal pump for general service

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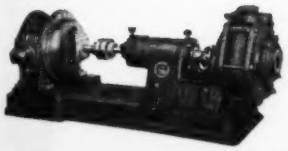
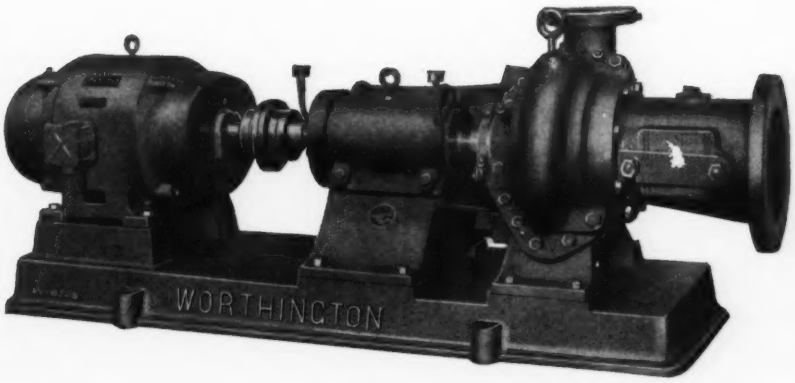
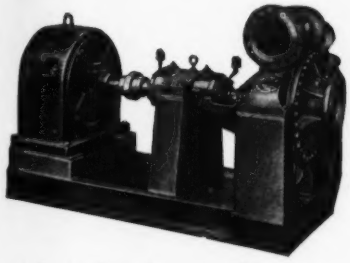


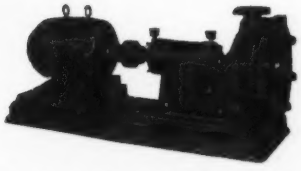
Centrifugal pump for chemicals, acids, and caustic solutions



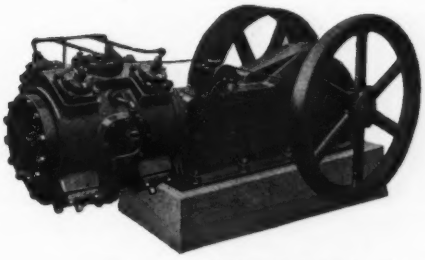
Paper stock pump with casing of special metal . . . and arranged for belt or motor drive



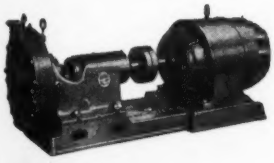
Centrifugal pump for sulphite digester service



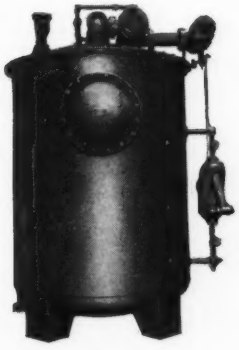
Centrifugal pump for chemicals, acids, and caustic solutions



Horizontal single-stage air compressor

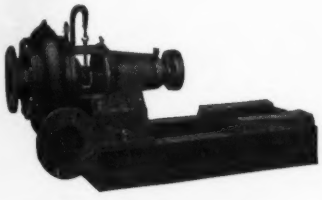


Centrifugal pump for black liquor service



Vertical steel-shell feedwater heater

Centrifugal pump for general circulating and stock agitating service



Centrifugal pump for green liquor service

WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: **HARRISON, NEW JERSEY** - Branch Offices and Representatives in Principal Cities throughout the World

1C8-9

WORTHINGTON

Organized Research Department

Dr. Thorne had always been convinced that technical progress can be made better and quicker if research ploughs the ground and paves the way. With the task in mind and in cooperation with his collaborators he organized a department of research to study not only the various phases of manufacture but also to take care of the testing of the finished product for the very purpose for which it was used. The observations made here told a much more useful story than could ever be derived from the evaluation of mere analytical pulp characteristics. Here it may be said that Dr. Thorne's leadership succeeded in bringing about a most fruitful cooperation between a highly trained technical staff and intelligent mill operators on the one side and the research department on the other.

When Kipawa Mill started production in 1920 the pulp was bleached in the usual way, that is in a one-stage process in Bellmer bleaching vessels. It was Dr. Thorne's desire to improve on the economy of the one-stage process which led him to apply a much higher stock consistency than could be used in the Bellmers. The advantages, not only as regards economy in the consumption of the bleaching agent but also the better quality which could thus be produced, were soon realized. But at the same time it was recognized that the pulp in the presence of a bleaching agent at the high stock consistency should be agitated as little as possible lest damage occur to the fibers. This was particularly important if bleaching was to be made a continuous process, a goal which Dr. Thorne had in mind already at the time when bleaching had just been introduced into the two Ontario mills. The result of these and other considerations was the well known Thorne bleaching tower and the multiple stage Thorne bleaching system, using either two and more high density stages or, as this system is usually applied, a high density stage carried out in the tower followed by a low density stage in the Bellmers.

In the original patent, granted on this continuous multiple stage bleaching process, provision is made also for using chlorine in gaseous form instead of bleach liquor, and this proved to be of importance when the pulp industry became more interested in chlorination as the first step of a bleaching process. Various modifications pertaining to the use of chlorine in the form of chlorine water were added to the original system and these have greatly contributed to the success of Dr. Thorne's chlorination-low density bleaching system as it is recognized all over the world.

Multiple Stage System Introduced

The multiple stage bleaching system with hypochlorite bleaching liquor in both stages was introduced in Kipawa Mill in 1926, and with this equipment on hand and the possibilities of adding further stages, an excellent opportunity was made available for developing the chemistry of various bleaching and refining processes and their practical application to the production of a variety of pulp types for rayon and other cellulose derivatives, as well as of papermaking pulp. Kraft pulp, too, may be bleached to a high degree of whiteness in the multiple stage bleaching and refining system. The Thorne bleaching system in its various modifications is now installed in thirty-five mills with a total capacity of one and a quarter million tons per year.

No doubt Dr. Thorne's system has greatly contributed to the development of the high quality of Kipawa Rayon Pulp to a degree which is acknowleged wherever rayon pulp is used as a standard of the world market.

Very recently Hawkesbury mill, which had made itself a name in the production of high grade bleached sulphite pulp for paper, was reconstructed for producing the same rayon pulp quality as Kipawa and thus for taking care of the increasing demand at home and abroad.

Dr. Thorne should be proud indeed to recall the fact that the production of wood pulp for cellulose products in the two mills has risen from a few thousand tons in 1919 to 160,000 tons in 1938. This is nearly one-fifth of the world's requirements for 1937 (850,000 tons).

An interesting story of Dr. Thorne's activities may be read from his numerous patents. It shows that he devoted thought to many other phases of the pulp manufacturing processes, making them the subject of valuable improvements. In this connection may be mentioned machines for the retention of fiber material ("Saveall"), water filters and a mechanical indicator for fiber losses.

Manifold Acknowledgement in Various Countries

Dr. Thorne's activities and success have been acknowledged in manifold ways and in various countries. The Technische Hochschule, Darmstadt, gave expression to the appreciation Dr. Thorne enjoys all over the world by making him an honorary Doctor of Engineering for "his outstanding achievements in the mechanical and chemical development of wood pulp manufacture." The Technical Association of the Norwegian Paper Industry presented him with an artistically designed diploma covering his appointment as their Honorary Member. This diploma expressed "warmest thanks for your outstanding contributions to the advancement of cellulose technique and the pulp industry, for your brilliance which is reflected upon Norwegian Engineering Art and for the good collegiate spirit you have shown on all occasions."

Dr. Thorne has been knighted by King Haakon of Norway as a Knight Commander of the Royal Norwegian Order of St. Olav.

We may close this review with a sentence which was written in the Norwegian periodical *Papir Journalen* on the occasion of Dr. Thorne's 60th birthday: "If success follows a man he owes it in few cases to mere luck or chance, but in nine out of ten cases to distinguished personal qualities—personality, character, energy, and charm."

I am glad to state that Dr. Thorne appears to fulfill most amply the qualification for the highest award the Technical Association has to make, namely that the award be given "to those whose achievements have definitely contributed to the technical progress of the Paper and Pulp Industry."

On behalf of the Executive Committee I have the honor of awarding to you, Dr. Thorne, the Tappi Gold Medal for the year 1938.

Not Now With Seaman Paper Co.

C. W. Sherman, president of the Seaman Paper Company, states that R. H. (Dick) Ashby is not now and has not been for some time in the employ of the Seaman Paper Company, of Chicago.

Perfect impression

These Dinosaur tracks, the finest of their kind ever discovered, were revealed by a flood in 1936 in Holyoke, Massachusetts. The impressions, perfect to the most minute detail, were made over 50,000,000 years ago. . . . they are just as clear today as when they were made. The large footprint was left by a Tyrannosaurus — King of the Tyrant Lizards. Man has never seen these monsters in living form but judging from the dimensions of their foot prints, they were over 30 feet in length and 15 feet in height. . . . the largest flesh eaters that ever lived.

WITH BENNETT ROSIN-WAX SIZE

Printers are demanding better papers to keep pace with the modern development of faster presses. Bennett Rosin-Wax Size enables the paper manufacturer to meet this demand because wax imparts a superior printing quality to the sheet which is not obtainable with Rosin Size. Wax acts as a wetting agent to oils, increasing the receptivity of paper fibres to the vehicles commonly used in printing inks. This results in more uniform impression with greater clarity of detail. Rapid absorption of ink is also secured with Bennett Rosin-Wax Size which contributes to quicker drying and less tendency to offset . . . an important advantage for printing at high speed.

For further information concerning the profitable application of Bennett Rosin-Wax Sizes in printing papers, write us direct or call in one of our experienced Technical Representatives.

EMULSION PROCESSES

BENNETT INCORPORATED

ORIGINATORS OF ROSIN-WAX SIZE

General Offices: Cambridge, Mass. • Plants: Lawrence, Mass., Cincinnati, Ohio, Chambly, Que., Hyde, England

Technical Association Meets In New York

F. C. Clark, Mill Manager Of The Pond's Extract Co., Is Elected President At The Twenty-Third Annual Convention Of The Association At The Waldorf-Astoria, Feb. 21-24 — Many Interesting Papers Presented

The Technical Association of the Pulp and Paper Industry held its twenty-third annual convention at the Waldorf-Astoria Hotel from Monday to Thursday inclusive. All the meetings were well attended and an unusually interesting program was carried out. Grellet N. Collins, the president of the association, delivered his annual address as follows:

President's Address

It is my pleasure to address you again at the annual convention of the Technical Association. It may be of interest to review briefly the general situation in the industry as it developed during the past year. You will recall that at this time a year ago, the pulp and paper industry had shown a decided improvement in both volume and prices. A number of new mills were brought into production and more are now being constructed to increase further the tonnage of pulp and paper in the United States and Canada in the coming year.

Raw Material Situation

PULPS.

The war situation in Spain and China has stimulated the demand for cellulose and the European situation among the different nations has made them conscious of their dependence on other countries for a supply of cellulose for a necessary war material. A number of foreign powers have, therefore, encouraged the building of pulp mills within their own territories. These pulp mills can, of course, be used for commercial pulps in time of peace.

It is axiomatic that as the pulp supply increases, the waste paper supply will also increase and the processes for reclaiming are being improved by the further use of "wetting agents" and detergents.

R. G. MACDONALD, Secretary

The pulp supply will be further supplemented by the development of the use of waste farm and agricultural products.

Over the next decade there will probably be an adequate pulp supply at the present or lower price levels. The developments of the pulping processes are progressing and it has been stated that during the coming year high grade cellulose will be produced commercially from southern pine by the sulphite process. Another plant has been projected which will make high grade pulp from northern spruce by the sulphate process. This indicates that there are still at least two schools of thought about which process will give the best economic results.

FREDERIC C. CLARK, President

HAROLD R. MURDOCK, Vice President

LONG-SERVICE

PACKINGS

FOR THE

PULP and PAPER INDUSTRIES

The lubricant in each brand has been especially compounded to resist the action of the liquids or gases pumped.

The lubricant is forced hot under pressure into each single strand before braiding. This keeps the packing soft and pliable on rods and shafts.

CUTNO PACKING

For pumps handling caustic soda, kraft and black liquor, sulphate, all alkali pumps and digesters.

PALMETTO PACKING

For steam, compressed air, bleach liquors, sulphite, sizes, sulphate.

SQUARE **KLERO** PACKING

Stainless, for white paper, stock pumps, jordans, clean-water pumps. Lessens dirt count.

SQUARE **PALCO** PLAITED PACKING

Made of high-tensile-strength cotton. For centrifugal and triplex pumps.

PELRO PACKING

For solvents, oils and waxes, fuel oil.

SUPER CUTNO PACKING

For pumps handling sulphuric and all heavy acids, digesters.

THE REAL COST OF A PACKING

is determined only by its

LENGTH OF LIFE IN SERVICE

and Its Effect On Rod or Shaft

MAIL COUPON for ABC PACKING CHART and FREE WORKING SAMPLE

GREENE, TWEED & CO., Sole Manufacturers
109 Duane St., New York, N. Y.

Name .....

Firm .....

City ..... State .....

Size of Packing Used .....

Kind of Liquid Pumped .....

By-Products.

The progressive companies have continued to develop their by-products from some of the waste materials which have been a nuisance to the industry in the past. This gives an additional source of income which has reached very attractive proportions in certain plants. Some of the by-products are fatty acids, turpentine, vanillin, alcohol, acetone, yeast, resins, soaps, fuels, and others. In fact, it appears as if the naval stores industry and the pulp industry were rapidly encroaching on each other's territory with respect to wood supply, products and markets.

Fillers and Pigments.

The quality and color of clay used by the paper maker has been improved tremendously and now equals or surpasses the finest grades of imported clays which were formerly used very extensively in the United States.

An additional domestic source of titanium dioxide has come into production within the last year and other new pigments and fillers are being offered. The industry has educated its customers to be so color conscious that the trade is making continual demands for a brighter white color. This has been carried to such an extreme that it has cost the industry an unknown amount to try to satisfy the demand for a brighter and whiter sheet. It is, however, all part of the march of progress of the industry toward the improvement in quality.

Coated Paper Developments

The demand for coated papers, especially on a ground wood base has progressed and very satisfactory results have been attained. The coating is being applied on the later machines by means of knives, rolls and air singly or in combination.

The latest development is the production of a coated surface which is made so smooth on the coating machine it needs no calendering. This will give the ultimate in printing surface without detracting from some of the other desirable characteristics of the sheet of paper and has many advantages from a manufacturing point of view as well as from a printing angle.

The development of coating adhesives and the improvement in the quality of clays and pigments already referred to contribute to their progress.

There are some new types of coatings one of which contains no pigment whatever and produces a beautiful high white finish without any calendering whatever. This is truly a contribution to the industry.

Mechanical Equipment

Substantial strides have been made in several units for preparing the fibers which produce pulp of desirable quality at a considerable saving in power.

While paper machines have remained the same in principle, numerous developments and refinements have been made to improve them.

The use of new metals and alloys should be mentioned as they have played a part in improving the machinery.

Progress of the Industry

In comparing the statistics of the industry for 1936 and those estimated for 1937, they indicate an increase of 12 to 14 per cent. The comparison is given in short tons.

Production

	1936 Census	1937 Estimated	Per cent Gain or Loss
Printing Papers (Excluding Coated)	1,636,837	1,791,639	9.4
Writing and Cover	627,853	646,051	2.8
Wrapping	1,879,323	2,067,255	10.0
All Boards	5,454,637	6,436,472	17.9
Tissue and Miscellaneous	1,438,615	1,582,477	10.0
Newsprint	921,000	946,500	3.0
Total	11,958,265	13,470,394*	

* Probably 1 or 2 per cent low.

These figures are estimated so give only an indication where the increases occurred in the different major groups. It is apparent that the boards contributed the greatest increase.

Imports and Exports of Paper—1937

The statistics for imports bring out the possibilities for further expansion in the industry if the United States is to be more self contained.

The figures are given in short tons.

	Imports	Exports
Printing Paper	18,000	14,474
Writing and Cover	2,000	16,330
Wrapping	19,500	38,368
All Boards	36,000	66,887
Tissue and Miscellaneous	51,500	44,944
Newsprint	3,000,000	17,807
Total	3,127,000	198,810

These figures also indicate the reason for so much interest being aroused about making newsprint in the south. Total imports indicate that there is room for further expansion in this country if the type of production is planned intelligently.

Let us now survey some of the activities of the Technical Association during the past year.

Text Books

In 1937 one of the text books was revised and two more are due to be revised and published in 1938. The text books are carrying their own financing, thanks to the Text Book Committee and the tireless efforts of those re-writing the various sections.

Engineering Data Sheets

The Canadian Technical Section are gathering useful information and publishing it to their members in the form of loose leaf engineering data sheets. A reciprocal arrangement has been worked out whereby TAPPI will be able to publish this information also. It is one of the important functions of this association to compile and distribute fundamental data which will be helpful to the industry. It is one of the ambitions of TAPPI eventually to collect sufficient data and summarize it so that it could be published in the form of a hand book similar to some of the engineering hand books now available. This would differ somewhat from the present text books inasmuch as it would contain many more tables and information which is not now within the scope of the text books.

Special Reports

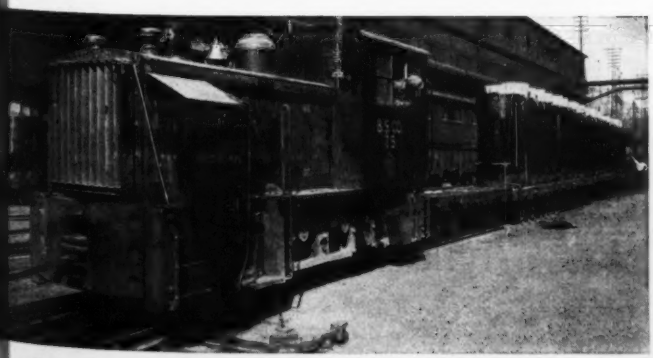
One of the greatest advantages of membership in this association is the personal contacts with others in the same line of work. The membership has a tremendous reservoir of information available. An

A PLYMOUTH FOR EVERY SERVICE!

65-ton Butane-Electric, replaced two 65-ton steamers.

One of three operated by this company. One butane. Two gasoline.

250 H. P. Gasoline, 30-ton, replaced 50-ton steam switcher.



Narrow gauge Plymouth direct drive diesel in mould yard service.

For heavy switching—investigate the propane-butane locomotive — cheap fuel, useful in many other ways in most plants—a Plymouth development.

Plymouth diesels in a wide range of types and sizes—standard and narrow gauge.

Here's an example — United Engineering & Foundry Company, Vandergrift, Pa. — heavy switching—replaced 45-ton steamer — averages 4.2 gallons gasoline per hour, 15c per hour total maintenance — one gallon lube oil per 48.6 gallons fuel, including change.

Other records just as convincing.

★ ★ ★

PLYMOUTH LOCOMOTIVE WORKS

Division of The Fate-Root-Heath Co.

PLYMOUTH, OHIO, U. S. A.

PLANT SWITCHING is cheaper with

PLYMOUTH

GASOLINE ★ DIESEL ★ BUTANE ★ PROPANE

LOCOMOTIVES

PACE

SETTERS

IN PRODUCTION

OR

IN CONSTRUCTION

DURING 1937

by

BAGLEY & SEWALL

BAGLEY B&S SEWALL

for KRAFT . .

for BOARD . .

for CIGARETTE .

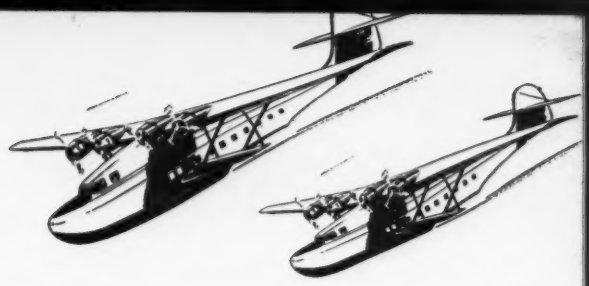
for PHOTOGRAPHIC SPECIALTIES

for SULPHITE SPECIALTIES

for FELTS . . .

for CELLULOSE .

PLANT
PRODUCT
AND POLICY . . .



. . A 210 inch Fourdrinier machine for Crossett Paper Mills, Crossett, Arkansas.

. . A 146 inch cylinder machine for Clifton Paper Board Company, Clifton, New Jersey.

. . A 96 inch Fourdrinier machine for Smith Paper Inc., Lee, Massachusetts.

. . A 110 inch Fourdrinier machine for Eastman Kodak Company, Rochester, New York.

. . A 136 inch Fourdrinier machine for Kalamazoo Vegetable Parchment Company, Parchment, Mich.

. . A 166 inch Fourdrinier machine for Armstrong Cork Company, Fulton, New York.

. . A 128 inch special cylinder machine for Dominion Cellulose, Limited, Toronto, Ontario.

* *We feel to a decided extent that a product is an indication of the factory and organization which produced it.*

It is our engineering policy to incorporate in the design of our paper machines a proper simplicity of construction to assist operation, yet with this maximum of simplified design include a type of rigid, well-designed construction, which we feel has been characteristic of Bagley and Sewall products.

Into machines of wide or narrow widths or of different types, go the same painstaking manufacturing efforts.

THE BAGLEY & SEWALL COMPANY ★ WATERTOWN, N. Y.

important phase of the activities are Special Reports of which nine were issued in 1937. The total of these reports to date is *over* 290. It was the desire to expand this service to members during 1937 but difficulties were encountered so progress was delayed. If the executive committee see fit, the way is now clear to enlarge this service and ample funds are available to do justice to the work and publish the information in more valuable form.

Committee Work

The opportunity is given members to serve on the various committees in the field of work in which each individual may be interested. The committees have sponsored papers on various subjects and recommended that certain work be done, which in some cases has been financed by this Association. We take this opportunity to thank the various committee members for their good work.

We wish to thank the Government Agencies for the cooperation we have received from them and mention specifically the United States Forest Products Laboratory, Madison, Wis., and the National Bureau of Standards in Washington.

Bibliography

Attention is called to the fact that this year the Bibliography is published as an annual bound volume and the abstracting service is a most valuable one.

Standards

The past year ten more TAPPI Standards were issued. These are rapidly gaining in prestige and are being studied by other technical organizations throughout the world. Here is another great opportunity for the Association to further serve its members.

Meetings

At the fall meeting in Savannah there was the largest registration of any fall meeting on record. The members and their friends were given an opportunity to visit a great many of the new mills and observe the latest developments. As the idea of making higher grade papers in the south develops it will become an even more interesting paper making territory. Up to date most of the new mills have been built with the idea of making only tonnage.

Membership

As the association is approaching the quarter century mark in age it has exerted a greater influence on the industry and today has over 1,500 individual members. Special attention is called to the fact that a great number of the members have entered management positions in the industry and TAPPI has endeavored to be of greater service to this group. We might add that a great deal of interest has been shown by the members in management subjects but it has not been the desire of this association to duplicate the efforts of any other trade association in the industry or conflict with them.

Financial

With the growth of the association the income has increased until today the financial position is the strongest it has ever been. The finance committee are to be commended for their efforts and the results produced. With the resources available it is recommended that the executive committee give the membership even better service and more information in the future than they have in the past.

Conclusion

In conclusion it may be said that there is a greater opportunity for the technical man in the pulp and paper industry than ever before and there is the best opportunity in the world for TAPPI better to serve its members and the industry.

In closing, I want to thank the officers, the executive committee, and committee men for their efforts in behalf of the association for the work they have done.

Report of the Secretary

R. G. Macdonald, the secretary of the association, submitted his annual report as follows:

In 1937 the Technical Association of the Pulp and Paper Industry made considerable progress, particularly in committee work and national and local Section meeting programs.

Membership

In 1937 there were 213 individual members elected, and 87 resigned or were dropped from the membership. On December 31, 1937, the total membership was 1,521, a new high record for membership.

There were 10 corporate and 12 contributing members elected. Two corporate members resigned. The corporate membership on December 31, 1937, was 87 corporate members and the contributing membership was 91.

The companies that became corporate members were: The Crossett Paper Company, Claremont Paper Company, Southern Advance Bag Company, Mohawk Paper Mills, Inland Empire Paper Company, The Cheaspeake Corporation, Ontonagon Fibre Company, Paterson Parchment Company, Champion Paper and Fibre Company, and Papeteries de Belgique.

The companies that became contributing members were: The Columbia Alkali Company, Appleton Wire Works, International Filter Company, Geigy Company, Goulds Pumps, Inc., Wm. H. Hooper & Sons Company, Foster-Wheeler Company, Johaneson, Wales & Sparre, Magnus Chemical Company, Bulkley, Dunton & Co., Bailey Meter Company, the Arundel Corporation and the Hermann Manufacturing Company.

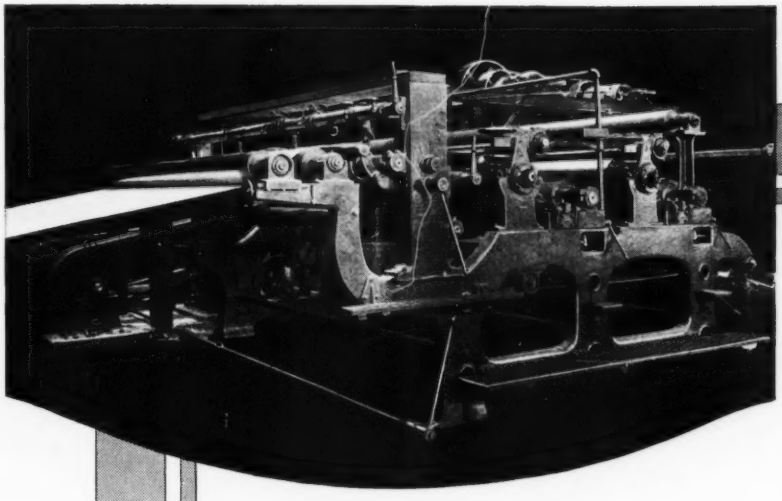
Necrology

The association sustained a loss of five members through death of W. T. Snyder, W. L. Wisard, J. A. Yates, L. M. Smith and J. M. Hibbs.

Special Reports on Manufacturing Problems

The association through its Service to Members Plan has assisted a large number of companies and individuals in the solution of their manufacturing problems. A number of inquirers were aided by information furnished by several members, such information being compiled into what are known as Special Reports which were sent to the individuals supplying information and to the company members of the association. The Special Reports issued in 1937 were on the following subjects:

Get peak cutter performance with the B-C duplex design



For well over a decade, the standout duplex cutter has been that built by Black-Clawson. It is a standout because it is vibrationless, trouble-free, and accurate to within 1/16".

The balanced, heavy-duty cutter bars are driven by over-capacity V-belt texrope drives to assure cutting accuracy under shock. The use of these drives also permits the drives to be reset for square with no loss of driving efficiency. Noise is greatly reduced and gear breakage is definitely eliminated.

Speed changers of the latest vertical type are direct connected. Guard rolls are located ahead of draw rolls, which, in turn, may be rubber covered and anti-friction bearing mounted if desired.

The first set of draw rolls is separately driven, allowing them to turn with both knives struck out if the sheet is to be led direct to the winder. Tapes are adjustable across the machine . . . the high-speed steel knives may be equipped with separate cut-off clutches...patented telescopic guide boards are standard equipment.

There's much more to tell about the B-C cutter, but we would rather tell it in person. Call in a Black-Clawson representative who'll give you the complete details. The Black-Clawson Company, Hamilton, Ohio, Owners of Shartle Brothers.

BLACK-CLAWSON

No. 263 — Blackening of Paper.
No. 271 — Paperboard Surfacing for Lithographing.
No. 272 — Wire Cloth Requirements for Pulp Washers.
No. 275 — Fuzz on Wire Side of Coating Stock.
No. 276 — Hair Cuts from Wool on M. G. Waxing Sheet.
No. 277 — Eliminating Fuzz in Mimeo Paper.
No. 278 — Sizing 100 Percent Rag Paper.
No. 279 — Wetting Down Wood Piles.
No. 280 — Casein Coated Paper for Offset.

Employment

Throughout the year the association has served as a clearing house for employment of members and helped a large number to become satisfactorily located in the paper and allied industries.

Fall Convention

The fall meeting of the association was held at the De Soto Hotel, Savannah, Ga., on October 18 to 21, 1937. More than 800 attended. A report of the meeting appeared in the PAPER TRADE JOURNAL on October 28, 1937. The success of the meeting was outstanding and was due largely to the efforts of D. G. Moore, general chairman, and his associates in Savannah.

Changes in Articles of Organization

At the Savannah meeting the following proposed changes in the Articles of Organization were approved and by mail ballot were later adopted by the association. The revised articles read as follows:

ARTICLE IV—OFFICERS AND ELECTIONS

1. The officers of the Association shall be the President and Vice-President, each elected for one year by letter ballot, as hereinafter prescribed; and the Secretary and Treasurer (or Secretary-Treasurer), appointed for one year by the Executive Committee.

2. The President shall preside at all meetings of the Association and shall serve as Chairman of the Executive Committee. He shall carry out the policies established by the Executive Committee. At the annual meeting he shall present an address discussing such subjects as are of value to the Association.

3. In the absence or inability of the President to serve, his duties shall be assumed by the Vice-President.

4. Nominations for President, for Vice-President and for members of the Executive Committee shall be made by a Nominating Committee of three appointed by the Executive Committee. The Nominating Committee shall also include on the ballot the names of any candidates proposed by 25 or more Active members, which candidates shall have previously given written consent to the placing of their names on the ballot.

5. Ballots listing nominations made, as provided in Paragraph 4 together with provisions for independent voting, shall be mailed to Active and Corporate members not later than six weeks previous to the annual meeting.

(a) The letter ballot shall close at noon of the day preceding the opening of the annual meeting.

6. A Tellers Committee of three, appointed by the Executive Committee, shall count ballots and announce results of election at the annual meeting.

(a) A plurality of votes cast for any candidate shall determine the election, and in the event of a tie, the election shall be decided by vote of the Executive Committee.

(b) The term of office shall begin at the close of the annual meeting.

ARTICLE V — EXECUTIVE COMMITTEE

1. The President and Vice-President (both ex-officio), with twelve other members shall constitute the Executive Committee. Four members of the Association shall be elected each year to serve on the Executive Committee for a period of three years.

2. The Executive Committee shall meet at the time of the annual and fall meetings and at such other times as may be required by the officers or upon request of three members of the Executive Committee.

3. Seven members of the Executive Committee shall constitute a quorum for the transaction of business.

4. The Executive Committee shall determine the policies and shall have general charge of the affairs of the Association.

5. At the time of the annual meeting of the Association the Executive Committee shall appoint a Secretary and Treasurer (or Secretary-Treasurer) and such other staff employes as are required to properly render service to all members, consistent with Association policies.

6. The Executive Committee shall pass on applications for membership according to qualifications provided in Article 3, Paragraph 1, of these By-Laws.

7. The Executive Committee shall have, hold and administer all the property and funds of the Association. In order to advise in these responsibilities, the President shall appoint a Finance Committee of three whose Chairman shall be a member of the Executive Committee. The Finance Committee shall annually present an audited statement of the Association's accounts to the Executive Committee.

8. Vacancies in any office or in the Executive Committee shall be filled through appointment by the Executive Committee until the next annual meeting.

Microchemistry Seminar

From June 21 to July 1, 1937, a seminar on Qualitative microanalysis was held at the Institute of Paper Chemistry for the benefit of members of the Technical Association employed by corporate members. There were ten representatives present.

Educational Cooperation

Two research projects were approved by the executive committee. An appropriation of $1,000 was made to finance the project of the Fundamental Research Committee on "The Existence and Nature of Fiber Membranes" and $600 was appropriated for a study of "Holocellulose" for the benefit of the Fibrous Material Testing Committee.

Publications

The papers presented at the fall and annual meetings were published in Technical Association Papers in June. The Lockwood Trade Journal contributed

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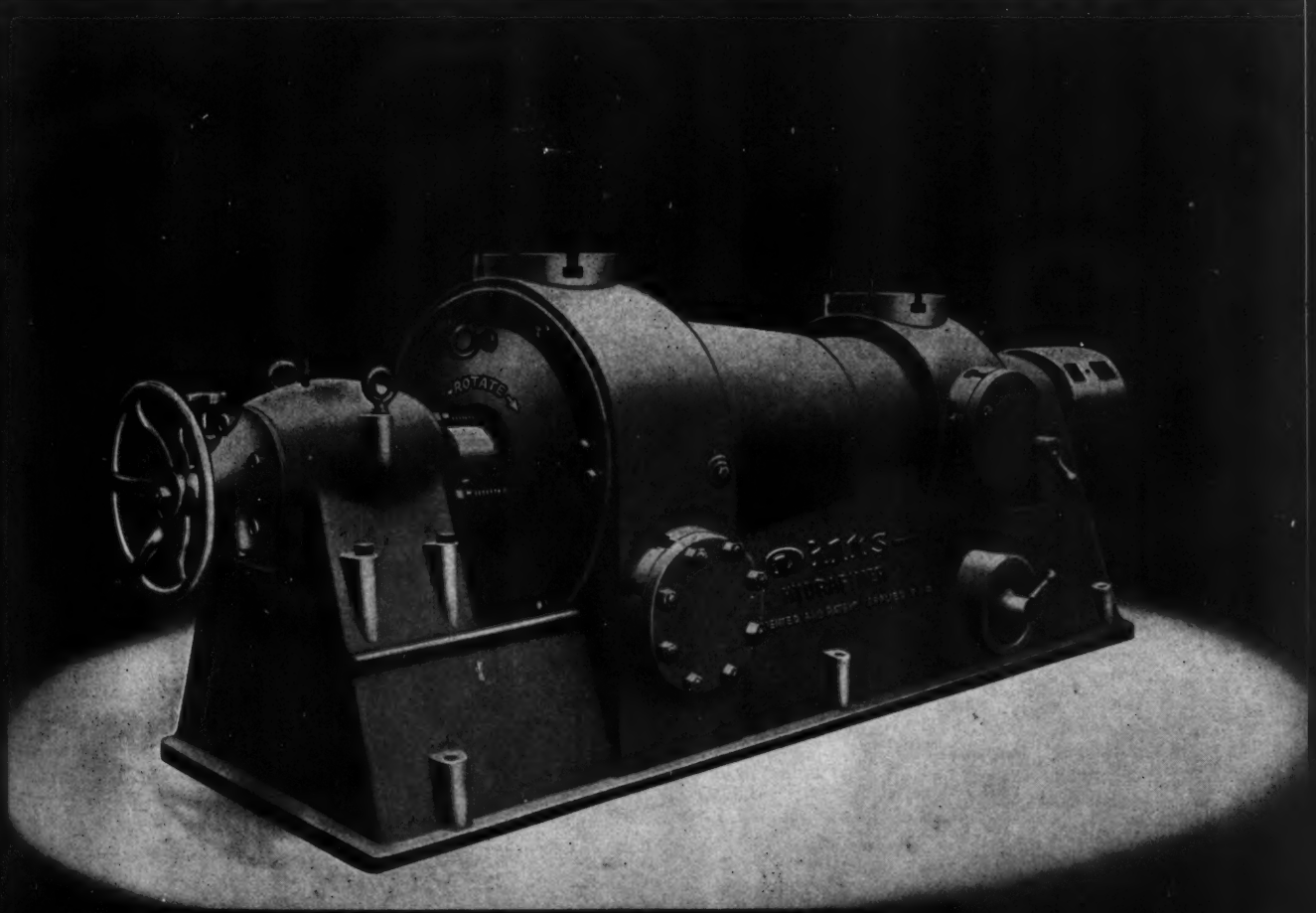


financially and through the editorial assistance of Henry J. Berger to their preparation.

Each week a number of papers were published in the PAPER TRADE JOURNAL. Other trade papers printed several of the association meeting papers.

The Annual Bibliography for 1936 was published in March and contained a list of U. S. Patents issued in 1935 and 1936. This volume was bound in cloth and is the first of an annual series. It is doubtful if any more collective bibliographs covering a number of years will be issued.

The 1937-1938 Year Book was published in September and reflected the cumulative progress of the association.

Work on the development of TAPPI Standards progressed and a large number of requests for copies were received. About 1,600 copies have been distributed.

The third edition Volume III of The Manufacture of Pulp and Paper was published during the year by the McGraw-Hill Publishing Company. Volume IV and V are due in 1938.

Sections

The local sections are very well organized and hold excellent meetings at frequent intervals. The members in northern New York applied for a charter. This was approved by the Executive Committee and will be issued at the next meeting of the organization to be known as The Empire State Section of TAPPI.

Committees and Division

The annual meeting program reflects the excellence of the work of several committees. Two new features are evident, first, the tendency of committees to prepare papers and to issue them as committee papers rather than through the authorship of individuals, and second, the trend toward making definite recommendations to the Association for financing or promoting research projects.

There were a number of personnel changes made during the year in the various chairmanships:

In the Management Division, B. M. Thomas of the Container Corporation of America succeeded W. M. Shoemaker of the National Vulcanized Fibre Company as general chairman, H. P. Cannon of the Upson Company succeeded Paul Koenig of the P. H. Glatfelter Company as vice-chairman.

In the Engineering Division, W. G. MacNaughton of The News Print Service Bureau succeeded M. H. Teaze of Hardy Ferguson Company as general chairman, F. P. Wilmer of the Halifax Paper Company succeeded Frederick Wierk of Johnson & Wierk as chairman of the Equipment Committee, A. E. Montgomery of J. O. Ross Engineering Company succeeded A. G. Darling of the General Electric Company as chairman of the Heat and Power Committee; James A. Lee of Chemical and Metallurgical Engineering succeeded James D. Miller of the Southern Kraft Corporation as chairman of the Materials of Construction Committee.

In the Raw Materials Division, Charles S. Taylor of the Riegel Paper Corporation succeeded James A. Lee as chairman of the Non-Fibrous Raw Materials Committee.

In the Operation Division, A. B. Clark of the Racquette River Paper Company succeeded N. F. Waters of the Champion Paper and Fibre Company as chairman of the Paper Finishing Committee.

There were no changes in the Research and Development Division except that no personnel were appointed to the Use Requirements Committee.

In the Converting and Consuming Division, J. D. Malcolmson of the Robert Gair Company succeeded Pierre Drewson of the Hinde & Dauch Paper Company as chairman of the Containers Committee.

In the Testing Division C. E. Hrubesky of the U. S. Forest Products Laboratory succeeded M. A. Youtz of the Drackett Company as chairman of the Fibrous Material Testing Committee.

Among the special committees the only change was in the name of the Color Committee which was changed to the Optical Properties Committee of which John L. Parsons of the Hammermill Paper Company is chairman.

TAPPI Elects Officers

The Technical Association of the Pulp and Paper Industry, at its annual meeting chose the following officers for the ensuing year:—President, Frederic C. Clark, mill manager, Paper Mill Division, Pond's Extract Company, Seymour, Conn.; vice-president, Harold R. Murdock, director, Research Department, Champion Paper and Fibre Company, Canton, N. C.; executive committee to serve 1 year, Frank D. Libby, assistant mgr., Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.; executive committee to serve 2 years, George D. Bearce, manager, Maine Seaboard Paper Company, Bucksport, Maine; Albert Bankus, vice president, Crown Zellerbach Corporation and Crown Willamette Paper Company, San Francisco, Cal.; executive committee to serve 3 years, Lorne C. Anderson, manager of manufacturing, Ontario Paper Company, Thorold, Ont.; G. S. Brazeau, manager, Everett Mill, Weyerhaeuser Timber Company, Everett, Wash.; K. W. E. Nicholson, manager, Southern Kraft Corporation, Panama City, Fla., and Georgetown, S. C.; B. M. Thomas, mill manager, Container Corporation of America, Manayunk, Pa.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 23, 1938—The Government Printing Office has received the folfowing bids for 143,600 sheets of buff gummed paper: Andrews Paper House of York, at $8.43 per M sheets; Barton, Duer & Koch Paper Company, $9.58; Walker Goulard, Plehn Company, $9.18; Whitaker Paper Company, $8.24; Mathers-Lamm Paper Company, $8.145; R. P. Andrews Paper Company, $9.50; Reese & Reese, Inc., $8.93; Stamford Paper Company, $10.00; Virginia Paper Company, $8.33.

For 2,525 sheets of 50 per cent or 100 per cent rag white waterproof ledger paper: Stamford Paper Company at $17.50 and $22.05; and Whitaker Paper Company, $29.10.

Strathmore Paper Co. Earns $206,756

HOLYOKE, February 21, 1938—The annual statement of the Strathmore paper company showed earnings of $206,756 in 1937 as compared with $143,733 in 1936. Net sales in 1937 were $2,983,525 as compared with $2,571,767 in 1936.

How Much Do We Know About Drying*

By F. C. Stamm[1]

A number of years ago, when W. G. MacNaughton was Secretary of TAPPI he made an extended trip through the industry and on his return wrote a brief resumé of some of the things which impressed him. Concerning the matter of drying he said there seemed to be *fashion* in the question of drying equipment because systems which were being thrown out of one mill were at the same time being installed in others. He went on to say that it reminded him very much of the old Model T Ford. There were many contrivances on the market which claimed to materially improve its operation, but after all it seemed to operate very satisfactorily without any of them.

Again, in 1930, R. S. Kellogg, in a paper on news print read before the Canadian Technical Section, spoke along a very similar line when he said, "Why should there be such a multitude of systems for the removal of condensate. Is this not one of the indications that there is much to be learned about the application of heat to drying paper?"

We have progressed much during the last twenty years in most of the phases that govern the manufacture of paper but in the matter of drying, we know very little more than we knew when the first so-called drainage system was installed. It is true that we have collected considerable literature on the subject but most of this is not based on facts but rather on the personal opinions of individuals. For this reason, opinions vary on some of our simplest operations which merely emphasizes Mr. Kellogg's statement that we still have much to learn.

Is it little wonder that the average superintendent or engineer has many queer notions about what goes on inside a drier? For years he has been told that water forms a blanket and stops the transfer of heat and yet most engineers familiar with the problem will tell you that water in a dryer does not materially effect the heat transfer. Is it not good policy to have water in your driers because the power required to turn a drier will increase rapidly as the water accumulates.

Again he is told that air and steam do not mix in the drier, that the air floats around in little bubbles and causes uneven drying. Or he is told that it settles to the bottom of the drier and is easily removed with the condensate. He is told that the best and only way to get rid of air is through rapid circulation. Then another tells him that he can never remove air by circulation since the steam will by-pass and leave the air behind, that the drier must be dead so that the air can settle to the bottom and then it is a very simple task to remove it.

He reads an article in his trade journal which points out that high temperatures on the wet end driers will case harden the sheet causing cockles, blisters, and excessive shrinkage. Then in the next issue he reads that the only way to overcome these troubles is to keep those first wet end driers right up to full steam temperatures.

He is told that on all tissue machines making light weight crepe the first wet end driers must be hot in order to set the crepe, yet he knows that his good friend Jim Bayley across the river is running his No. 2 machine on light weight crepe and carries the first wet end driers cool enough to put your hand on them.

And so it goes. For years we have accumulated miscellaneous opinions without bothering to substantiate the claims until we now have a bewildering array of conflicting so-called facts. You have only to read the reports of the various divisional meetings of the Superintendents Association when they have their round-table discussions to realize how utterly lost many of them are when this matter of drying is brought up.

In a paper such as this, it is impossible to go into very much detail on a subject which is as broad as this matter of drying, but in order to show the variety of opinions that exist, I will take one phase, that of air accumulation in driers, and try to bring out some of the conflicting opinions.

Air and Steam Are Two Gases

Air and steam are two gases and as such, will mix together the same as will oxygen and nitrogen. Once they are mixed, the only way to separate them is to condense the steam, thus leaving the air by itself. It is therefore, natural to assume that this air distributes itself evenly throughout the drier and of all the data available on the subject we find only one instance where an actual test was run and that was made by L. D. Tatley and reported in the April 7, 1927 issue of the Paper Trade Journal. Table I was taken from this paper.

TABLE I

Test Number	Sampling Point	Air %
1	Top	2.52
2	Bottom	2.39
3	Bottom	2.32
4	Middle	2.26
5	Top	2.24
6	Middle	2.38
7	Top	2.12
8	Bottom	2.15
9	Middle	2.28
	Average, top	2.29
	Average, middle	2.31
	Average, bottom	2.28

In the average drier, operating at speeds of over 300 feet per minute, the condensate is carried up the side and as it breaks and falls back to the bottom it creates a regular rain storm. this turbulence increases with higher speeds and it is thus hard to visualize how any stratification could exist under such conditions. Air does not settle to the bottom, it stays mixed with the steam and will thus remain until it is removed.

Air Directly Effects the Temperature

We have read statements to the effect that the presence of this air mixed with the steam gives it the same temperature as the steam but that it does not have the heating capacity of all steam. We have only to read Dalton's law of partial pressures to realize that the addition of air to steam drops the tempera-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Member TAPPI, Consulting Engineer, Lockport, N. Y.

ture of the combined gas. To be exact, pure steam at 10 pounds pressure has a temperature of about 240 degrees. The addition of 20 per cent air to this steam will drop the temperature to 228 degrees for the same 10 pounds pressure. Table II shows this relation for various pressures.

TABLE II

Table showing temperature reduction caused by air at various pressures.

Gauge Pressure	Temperature of Steam with No Air Present	Temperature of Steam Mixed with Various Amounts of Air (Per cent Air by Volume)		
		Ten Per cent	Twenty Per cent	Thirty Per cent
10.3	240.1	234.3	228.0	220.9
25.3	267.3	261.0	254.1	246.4
50.3	298.0	291.0	283.5	275.1
75.3	320.3	312.9	304.8	295.9
100.3	338.1	330.3	321.8	312.4

The Effect of Air on Heat Transfer

Let us now consider the effect of this air on the rate of heat transfer through a drier. There are quite a few references to this matter but as usual, the results vary considerably. One writer states that if all the air coming with the steam were left in a drier and allowed to accumulate for a whole week, the final effect on the heat transfer would hardly be measurable. Another states that 2 per cent air mixed with the steam would reduce the heat transfer about 16 per cent and still another says that in extreme conditions ½ per cent air will reduce the heat transfer as much as 50 per cent. Again I refer to Tatley who has given the matter more thought than most of us and Fig. 1 shows his findings on the subject. Tatley shows that a 10 per cent concentration of air will reduce the heat transfer about 35 per cent.

Where Does Air Come From

The question which naturally presents itself is, where does all this air come from. First, unless adequate provision is made to remove it, the air which is drawn into the driers on the Sunday shut down will not be totally removed on the Monday morning start-up. Second, if the machine is operating at low pressures, the driers may be under a vacuum at times and then nothing can prevent the air from entering through the packing glands. Third, most gases are soluble to a certain extent in water and unless you have good feed-water treatment these gases will pass right along with the steam. Table III (taken from Kidwell's Hand Book) shows the solubility of various gases for different temperatures and you will

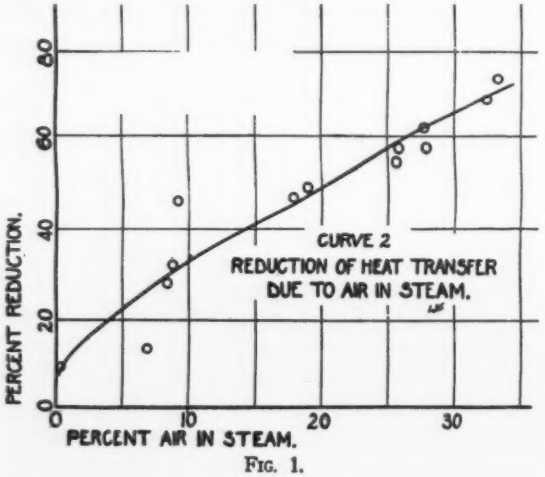


FIG. 1.

TABLE III.—AMOUNT OF GAS ABSORBED BY WATER

Name of gas	Temperatures		Amount of Gas absorbed by 1,000 cc. Water under a Pressure of one Atmosphere							
			Oxygen		Nitrogen		Carbonic Acid		Carbon Monoxide	
	Deg. C.	Deg. F.	Volume, cc.	Weight per 1,000	Volume, cc.	Weight per 1,000	Volume, cc.	Weight per 1,000	Volume, cc.	Weight per 1,000
	0	32	48.9	0.070	23.5	0.029	1713	3.38	35.4	0.044
	20	68	33.3	0.044	16.5	0.019	942	1.73	24.9	0.028
	25	77	31.0	0.040	15.6	0.018	830	1.49	23.4	0.026
	30	86	29.0	0.037	14.9	0.017	738	1.31	22.1	0.025
	40	122	26.4	0.033	13.6	0.015	607	1.04	20.4	0.022
	60	150	23.8	0.028	12.5	0.013	438	0.71	18.2	0.018
	100	212	23.2	0.024	12.9	0.012	...	...	19.2	0.017

NOTE.—The above are a summary from various experiments by Bunsen, also A. Winkler, "Zeitschr. f. phys. Chemie," 1892, vol. ix. p. 171; and Bohn and Bock, "Wied. Ann.," 1891, vol. xlviii. p. 319. The volumes in this table are for the respective temperatures.

note that CO_2 is much more soluble than oxygen. Fourth, it is quite well agreed that the carbonates in the feed-water tend to break down at the higher temperatures and pressures and thus form CO_2 gas which is carried along with the steam. From this it it evident that whether or not air will bother you is dependent on your local conditions. There are mills where the air carried over with the steam is very negligible. There are others where it will cause considerable annoyance if not properly removed.

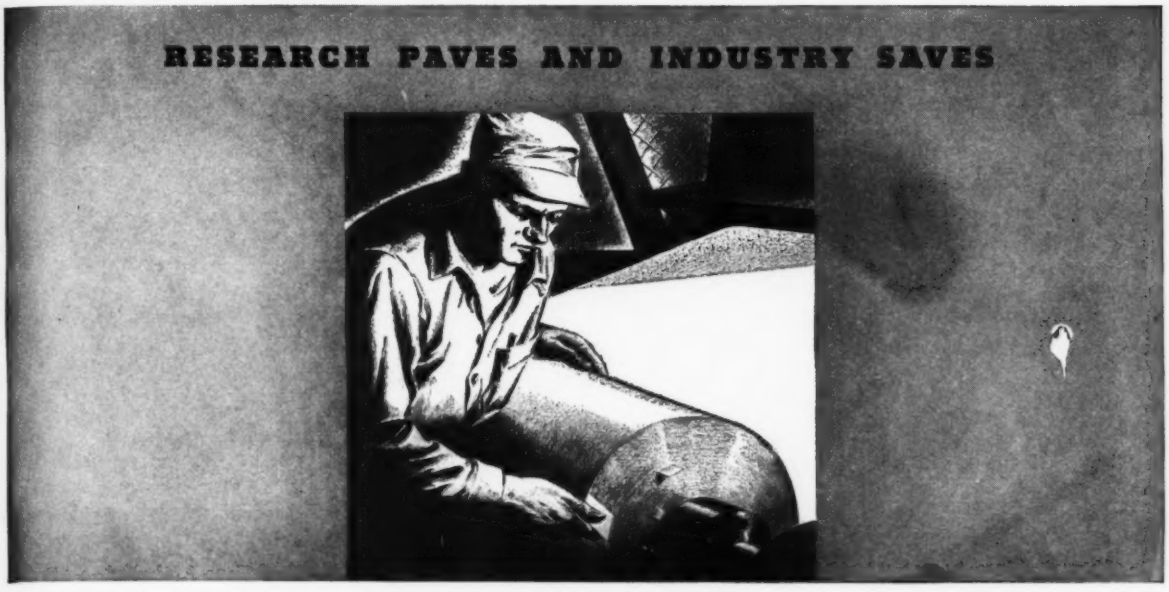
How Can Air Be Detected

One of the reasons why there has been so much misunderstanding concerning this matter of air is due to the fact that air is a rather intangible substance and its presence is hard to determine. Recently, however, an instrument has been developed which not only indicates and records the presence of air but will also automatically remove it from the system. The fundamental theory on which this instrument operates is very simple. Since the direct effect of air mixed with steam is to lower the temperature of the steam for any given pressure, it is evident that we need only to compare the actual temperature of the steam with the theoretical temperature to indicate the presence of any foreign gas.

The instrument consists of two recording elements, one a thermometer element which responds to the actual temperature in the drier, and the other a pressure sensitive element which responds to the changes in pressure in the drier but which is so calibrated that it reads the theoretical temperature. Thus, when the instrument is in operation, the pressure element records the temperature as it should be, and the temperature element records the temperature as it actually is. Any difference between the two pens indicates the presence of air. A suitable contact in the instrument operates a large relief valve which opens to relieve the air when the temperature starts to drop.

The Charts Tell the Story

A continuous chart taken from a machine will generally indicate some interesting things which do not show up when just spot readings are taken. For instance, Fig. 2 is a record from a machine equipped with a standard circulating drainage system with a vacuum pump pulling on the first wet end drier. The top line shows the temperature as



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it should have been and the bottom line shows where it actually was. If no air is present, these two pens would remain right together. The difference as shown indicates a serious accumulation of air.

A Typical Record

Fig. 3 shows a typical record when the instrument is automatically relieving the air. Each time the valve is opened it makes a mark on the chart and thus we have a graphic record of the amount of air which is being relieved from the machine. You will note that around 8 o'clock in the morning, very little air was coming, while at 6 o'clock at night the instrument was opening the valve at frequent intervals. This shows that the rate at which air accumulates will vary from hour to hour, from day to day, and also with the seasons. The relief must be flexible enough to take care of these variations automatically. Furthermore, if no air is present, why should we continue to blow the wet end driers to the hot well or vacuum pump. It is hoped that the instrument as described above will help take some of the guesswork out of the question of drying.

Need of Further Research

From the above brief discussion it might seem that we know quite a little about this one phase of drying but let me assure you that we have hardly scratched the surface. We still know very little about heat transfer. We do know that a drier, as it operates today, does a very poor job compared with other mediums of heat transfer. It might be that much of this trouble is due to a light film of air that lays next to the inner surface of the drier and thus effectively reduces the heat flow. It may be the air film on the outside of the drier, between the sheet and the drier, that is doing the harm. More tension on the drier felt will help reduce this outside film and that brings up another question about which we know very little, namely, what is considered the proper tension to carry on a drier felt. Some mills run with as low as 3 pounds per inch of width. Others as high as 10 pounds. There are many mill managers who would like to get more drying capacity without going to the expense of

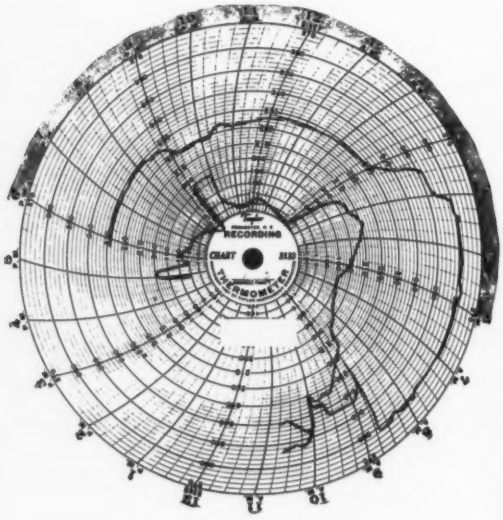

Fig. 2.

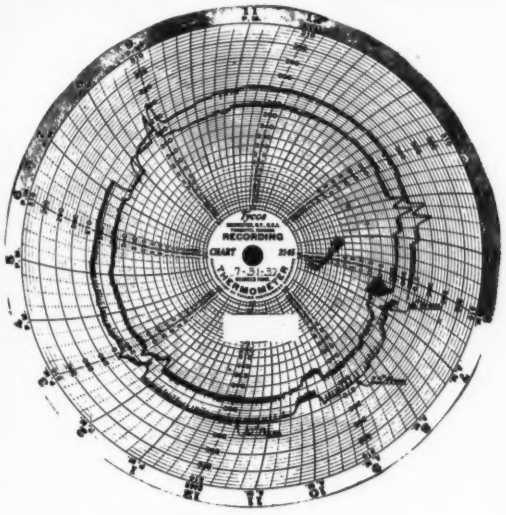

FIG. 3.

additional driers. Their old felt rolls are not designed to carry much tension but they would gladly go to the expense of new rolls and equipment if they could, for instance, be assured of a 10 per cent increase in drying capacity by carrying a higher felt tension.

NEED FOR FURTHER RESEARCH

So I say there is need for further research in this matter of drying and it is my frank opinion that if we want this work to be free of prejudice and accurate as to facts, the only way it can be accomplished is through TAPPI itself. It means laying out maybe a five year program, setting aside a definite plan of research and setting aside a certain amount of money to finance the work. Much can be done by the various universities who are interested. Much can be done by individuals or by mill departments, but the whole thing must tie together and the conclusions must be proved in actual mill practice. Such a program will, I think, clarify much of the misunderstanding that exists today on this subject of drying.

ACCURATE DATA WELCOME

One phase, about which I have said very little and over which wages a continual controversy, is this matter of temperature control in drying. Every mill making high grade sheets is bothered with excessive shrinkage and cockle at times. What causes it? Can these troubles be reduced by wet-end temperature manipulation? What effect has dry-end graduation on these troubles? Dozens of mill men would welcome accurate data on these questions.

Conclusions

In the foregoing I have tried to bring out just a few of the questions about which we know very little. In so doing it may seem that I have taken a prejudiced stand on some of my own conclusions. That is human nature, and that is why it is necessary for some body like TAPPI to step into the picture and approve or disapprove as they see fit. I think you will agree however, that there is still much to be done on this matter of drying.

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Influence of Atmospheric Humidity and Temperature on the Moisture Content of Paper Board*

By R. W. K. Ulm[1]

Abstract

1. An hysteresis exists in the moisture contents of paper boards at equilibrum with atmospheres of given relative humidities at all temperatures in the ordinary range. The direction of approach to the equilibrium condition, i.e., whether by adsorption or by desorption, determines more than any other factor the moisture content at a given relative humidity.

2. The effect of temperatures on the moisture content of board in equilibrium with an atmosphere of a given relative humidity is noticeable at all humidities studied. In the higher range of relative humidities, the effect is relatively small, the moisture content passing through a minimum in the neighborhood of 70 deg. F. In the lower range of relative humidities the effect of temperature is larger, the lower the relative humidity. At the low humidity, the moisture content decreases linearly with increasing temperature.

3. At a constant absolute humidity the moisture content at equilibrium decreases with increasing temperature. It is apparent, therefore, that, excluding the phenomenon of hysteresis, the moisture content of a piece of board is determined by fixing any two of the three variables, temperature, absolute humidity, and relative humidity. The specification of only one of these variables is insufficient to determine the moisture content. It is also impossible to fix arbitrarily all three, since only two can be independent; specification of two determines the third.

The literature which deals with moisture-humidity phenomena of cellulose and cellulosic materials is abundant and sometimes rather confusing. Some publications deal with purified cellulose, others with fibers known to be lignified to a greater or lesser degree; some concern themselves purely with sorption hysteresis, others deal only with the mechanical properties of some cellulosic material, such as paper; some consider the interrelation of more than two variables, but in general the literature contains work which reports the correlation of only two variables for any one given specimen of raw material. The results are rather confusing. It was in an attempt to clarify the field of moisture content-humidity-temperature phenomena that this work was undertaken. The approach has been entirely from a practical point of view. The temperature and humidity ranges were chosen so as to cover the values of these variables ordinarily met in actual atmospheric conditions. The boards studied represent the more important types.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

A portion of a thesis submitted in partial fulfillment of the requirements of the Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1937.

[1] Member TAPPI. Container Corp. of America, Manayunk, Philadelphia, Pa.

Historical Survey

Sorption of Water Vapor

The study of the effects of atmospheric moisture on papers seems to have been initiated by Klemm (*1*) and Herzberg (*2*). The former concluded that the moisture content at equilibrium was proportional to the absolute humidity and showed that temperature and barometric pressure were of importance. He further reported that the degree of sizing does not greatly influence the time rate of adsorption. Wood-free papers were found to take up moisture more readily than wood-containing papers, i.e., those containing mechanical pulp.

von Roessler, Fenchel, and Cornely *(3)* determined the equilibrium moisture contents for several half-stuffs and papers. They found that, between 80 and 40 per cent relative humidity, the moisture content was a straight line function of the relative humidity. The previous history of the stock or paper influenced the slope of this line. The time rate of adsorption was greater than the rate of desorption. Kress and McNaughton (*4*) studied the moisture regain in several papers and found an almost straight line relation between absolute humidity and moisture content in the range of humidities ordinarily encountered. Wilson and Fuwa (*5*) published relative humidity-moisture content curves for three pulps and four papers, which demonstrated that the more lignified furnishes absorbed the most water.

Fay (*6*) reported data concerning the equilibrium moisture contents after a specified time in atmospheres of given humidities. In general, the unbleached pulps showed a higher moisture content than the same pulps after bleaching, but the difference was not marked. The moisture-humidity curves did not make smooth lines. There was possibly an error in the humidity measurements, as a hair hygrometer was used.

Jarrell (*7*) reported the results of taking several papers through the relative humidity cycles 35-50-65-80-65-50-35-50-65-80-65-50-35-65-35 per cent at 70 deg. F. Hysteresis loops were observed. Samples of papers of the same class showed wide differences in equilibrium moisture content. Papers containing mechanical, rope, or sulphate pulp had, in general, higher equilibrium moisture contents than papers containing rag, sulphite, or soda pulp. Of the papers examined, newsprint exhibited the highest and blotting paper the lowest moisture content. Time rates of absorption were determined for the cycle 35-65-35 per cent. Adsorption was faster than desorption. Two days were necessary for equilibrium on adsorption, six on desorption. Fiber furnish seemed to be less important than ash content in determining the moisture content at a given humidity.

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Walter (*8*) observed that moisture was adsorbed and desorbed more rapidly by strips cut in the machine direction than in the cross direction. At low humidities the equilibrium moisture content increased more slowly, in the middle range at the same rate, and at the higher humidities faster than the moisture content of the air. Ross Campbell (*9*) found that, with fine papers, the equilibrium moisture content depended more on the relative humidity than on the fiber furnish.

McKee and Shotwell (*10, 11*) published two papers which dealt with moisture-humidity relations in paper. The first was concerned with the determination of the temperature effect on the equilibrium moisture contents. No numerical data were given, but curves were included which demonstrated that the equilibrium moisture value was an exponential function of the absolute humidity (when the log of the moisture was plotted against the absolute humidity, a straight line resulted). Further curves were given to show that, at a constant relative humidity, the equilibrium moisture content decreased with increasing temperature until 70 deg. F. was reached. Above this temperature it increased with increasing temperature. Also, at a constant absolute humidity the moisture content was a constant between 60 and 110 deg. F. The second paper (*11*) dealt with the time rate of adsorption. The rate of moisture change was found to vary with the difference between the actual moisture content and the equilibrium value. The relation was not one of simple proportion; when the rate of adsorption was plotted against the moisture differential, a sigmoid curve resulted. The kind of stock and the amount of filler seemed to influence the rate of moisture regain, but the forms of the moisture-time curves were similar.

Arendt and Wathelet (*12*) found that, with writing and printing papers, the degree of sizing and of beating were practically without influence on the equilibrium moisture content. Some fillers were shown to be hygroscopic and, therefore, modified the adsorptive capacity of papers containing them. Weber and Snyder (*13*) reported that the usual sizing materials have little effect on the moisture content response of paper to changing relative humidity, except with respect to the rate of change.

Briefly, to summarize the foregoing literature survey, it may be said that the present status of knowledge of paper-moisture phenomena is such that the following generalizations are admitted to be true:

Sorption hysteresis exists. Its magnitude and form may depend upon many things, among which are temperature, relative humidity range, magnitude of relative humidity changes, and previous moisture history.

The moisture content of a piece of paper depends upon the relative humidity and temperature of the atmosphere in which it is in equilibrium, whether equilibrium has been approached by adsorption or by desorption, the magnitude of the relative humidity change, and the presence of non-hygroscopic materials in the sheet.

The following points are either known or disputed:

What part does absolute humidity play in determining the moisture content and the magnitude of the hysteresis in paper?

How do changes in temperature affect these factors? The following work was undertaken to clarify these points and to answer these questions.

Experimental

Materials

Samples of twelve commercial boards of various types were obtained directly from the mills producing them. They were "run of the mine" samples; nothing was known of their exact moisture content upon leaving the dry end of the machine, nor of the humidity-moisture history prior to their receipt at The Institute of Paper Chemistry. Here they were stored in a constant humidity room until needed.

The samples used are described briefly below. The capital letter preceding each is the code letter which will be used throughout the presentation to identify the samples.

A. 0.009 inch cylinder straw.
B. 0.016 inch jute test liner. This was produced on a cylinder machine and had 0.002 to 0.0025 inch of 100 per cent hard kraft liner, the remainder being filler, the furnish of which was of corrugated waste, unsorted and mixed papers.
C. 0.016 inch solid kraft board. This was made on a Fourdrinier machine in the South. It was designated as 48 pound water finish kraft.
D. 0.016 jute test liner.
E. 0.016 solid kraft board. This was made on a cylinder machine in the northern part of this country.
G. 80 basis[a], 0.023 inch bleached manila-lined chipboard.

[a] By 100 basis, it is understood that 100 sheets, cut 26 by 38 inches, weigh 50 pounds. It is by this specification rather than by weight that most folding and set-up types of boxboard are marketed.

The Humidity Chamber

The humidity chamber (Fig. 1) consisted of a large sheet metal box constructed of 24-gauge galvanized iron strengthened as needed by angle irons. All permanent metal-metal joints were riveted and soldered to make the box air-tight. The external surface of the box was covered with insulation, cemented to the metal by means of sodium silicate. When it was not necessary to see the inside of the large chamber, the large glass window was covered by a blanket of the same material.

The interior of the box was separated into two compartments by a partition. The large compartment on the left was used for conditioning and for strength testing; the small one to the right was used for elongation and moisture measurements, and for maintaining the moisture content of the samples while the strength testing instruments were being inserted or removed from the larger compartment. To facilitate this operation, the entire left end was constructed in such a way that it was separate and removable from the rest of the box. When in place, it was held tightly by four slip bolts and the joint was made airtight by a thick rubber gasket. Similar gaskets were used on the doors. Several thin rods, from which the samples could be conveniently suspended, were hung from the roof of the box in each compartment.

In order that the samples might be handled and the testing instruments operated in the box without exposure of the contents of the box to the outside atmosphere, two arm holes were cut in each compartment. The holes in the large compartment, and one hole in the small compartment, were used for handling the samples and operating the strength instruments. The other hole in the small compartment was used only for hanging the elongation and moisture samples on the balance chain. Into these holes were soldered cylindrical metal flanges extending perpendicularly into the box for a distance of one inch and having the inner edge rolled to facilitate fastening of the rubber sleeves. These sleeves were made of rubberized cloth cemented and sewed in the form of truncated cones. With the rubber side towards the interior of the box, the large ends of the

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- Shredded Waxed
- Soap Wrappers
- Waxed Glassine
- White Oiled Loin

TRADE NAMES

- Cure-Rite
- D-O-K
- Double Royal White
- Insulator
- Isyn-Gloss
- Kalafilm
- King's Seal
- Non-Stain
- Print-O
- Royal White

WRAPPING PAPERS

- Christmas Wrapping
- Embossed Wrapping
- Fruit Liners
- Fruit Wrappers
- Gift Wrapping Paper
- Laundry Papers
- Market Papers
- Store Wrapping
- Tomato Wrappers

TRADE NAMES

- D-O-K
- Garcia Gold Standard
- Gold Standard
- KVP
- Klothwhite
- Market
- Prosperity Waterproofed
- Steak Interleaving
- White Eagle Waterproofed

sleeves were fastened to the flanges by means of metal bands drawn tight by small bolts. Into the small ends of the sleeves were inserted metal cylinders over which were spread the open end of the rubber surgical gloves. The gloves were cemented to the sleeves. The metal spreader rings in the small ends of the sleeves were found to facilitate the insertion and removal of the operator's hands.

In the front of the large compartment was a large horizontal glass window, and in the smaller, a vertical window. The glass was double thick and was set in putty to make the joint airtight.

On top of the small compartment was a Chainomatic chemical balance. The left-hand pan of this balance was replaced by a short brass chain which led through a hole drilled in the bottom of the balance case and on through a half inch hole in the top of the box. This hole was situated in line with the middle of the window and one inch back from the front of the box. On the lower end of the chain was a small wire hook. When weighings were not being made, the hole was sealed with a small rubber stopper.

The box was constructed with four connections for attaching the blower and humidifying chamber. These consisted of 2-inch galvanized tubing extending from 6 inches behind the box through the back wall and on to the front of the box. Inside the box they were drilled with three-quarter inch holes on 2 inch centers. hTe outlets differed from the inlets in that the former had a T connection directed upward and located about 2 inches behind the back wall of the box. Into these holes the psychrometer was inserted when it was decided to use this instrument for the measurement of humidity. When not in use all these holes were sealed with rubber stoppers. Fig. 1 shows a photograph of the front of the equipment.

Circulating and Humidifying Equipment

The air flowing through the humidity box was largely recirculated, an indeterminate amount of fresh air being continually added on the suction side of the blower to make up for the leakage on the pressure side of the system. The air from the outlet was carried in 2-inch rubber automobile radiator hose to the blower, which was a direct motor-connected Sirocco No. 00 fan. This size blower had a capacity of 64 cubic feet per minute at free delivery. From the blower the air went to the humidifying chamber. This consisted of a galvanized metal box which had been coated on the inside with acidproof paint. Part of the top was removable, being attached to the box by sheet metal screws and sealed with a thick rubber gasket. This exposed a six-bladed paddle wheel on a shaft which extended through one wall and carried a pulley on the outside. The outside bearing and the pulley were in a well, closed at the bottom so that the whole chamber could be immersed to a considerable depth in a constant temperature bath. The proper salt solution was placed in the bottom of the chamber to a depth of 1.5 inches, and when the paddle wheel was running a spray was thrown into the incoming current of air. The outlet end of the humidifying chamber was equipped with three baffles and a glass wool filter for the removal of the spray. The air was carried from the filter chamber to the inlet of the humidity box by the use of more hose.

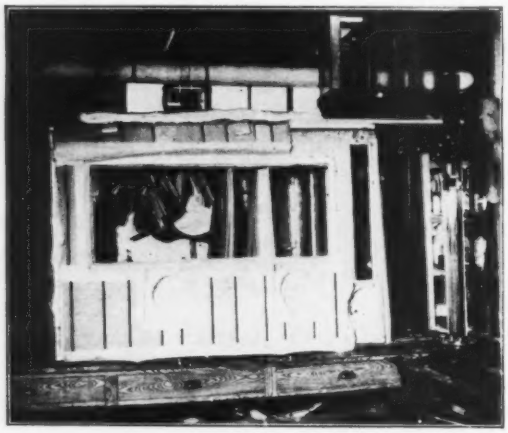

Fig. 1.
Humidity Chamber for Determining Moisture Content of Board

Measurement of Humidity

The primary standard of humidity was psychrometric. A psychrometer was constructed by inserting two calibrated Anschutz thermometers and a water feed chamber in a large rubber stopper. A wick covering the bulb of one thermometer and dipping into the water chamber converted this to a satisfactory wet-bulb thermometer. The two thermometer bulbs were separated by a coated metal plate to eliminate errors due to radiation or cross currents. When a humidity measurement was desired, the psychrometer was inserted in the T connection on the outlet from the box. After constant temperatures had been reached, the thermometers were read to the nearest tenth degree C., the calibration factor applied, the temperatures converted to Fahrenheit, and the humidity read from suitable tables (*14*).

At some humidities the psychrometer could not be used continuously without throwing the humidity of the system out of balance, so a precision hair hygrometer was adopted as a secondary standard. This was calibrated twice a day against the psychrometer. The calibration factor was found to vary with the humidity, with the temperature, and occasionally with some undetermined variable.

Control of Humidity

According to the plan when the box was originally designed, the humidity was to have been kept constant by remaining in equilibrium with certain saturated salt solutions. This had the obvious disadvantage that the humidities obtained could not be arbitrarily chosen, but were determined by the choice of the salt and the temperature. After a few trial runs with such a control, it was discovered that the connections to the blower and humidifying chamber could not be made air-tight and conveniently preserve the flexibility, that is, the ability to control independently the humidities of the two compartments. The following plan of control was then tried, found satisfactory, and adopted. As has been said, the humidity in the laboratory was quite low. Salt solutions were then chosen which gave humidities slightly higher than the desired values. Those selected are shown in Table I.

TABLE I.

Desired Relative Humidity Per Cent	Salt	Actual Relative Humidity Per Cent	Temperature Deg. C.
85	$Na_2CO_3 \cdot 10H_2O$	87	24.5
65	$NH_4Cl + KNO_3$	72.6	20.0
45	$Na_2Cr_2O_7 \cdot 2H_2O$	52	20.0
25	$CaCl_2 \cdot 6H_2O$	32.3	20.0
25	$LiCl \cdot H_2O$	15	20.0

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The selection of the proper salt for the 25 per cent relative humidity control depended on whether the room humidity was more or less than 25 per cent. If less, calcium chloride was used; if more, lithium chloride. The leakage on the suction side of the blower was increased by cutting a half inch hole in the rubber hose. The leakage was then adjusted by means of a piece of friction tape over the part of the hole until the undisturbed surface of the saturated salt solution in the humidifying chamber was insufficient to make up the moisture desired by the dry air entering the hole. Under proper conditions the leakage could then be more than overcome if the paddle wheel was run. A hygrometer was constructed using a strip of cellophane as the activating element, attached to a mercury switch, and made to operate a relay which, in turn, controlled the motor driving the paddle wheel. This was placed in the large compartment. When the humidity was rising, the cellophane would stretch and made contact at the mercury switch. This would throw the relay, shutting off the motor and thus stopping the paddle wheel. The small leakage would then allow the humidity to fall very gradually, thus causing the cellophane to shrink and activate the relay. The paddle wheel would then start and the humidity would rise very gradually until the stretching cellophane again stopped it. The range of hunting seemed to be less than ± 1 per cent relative humidity.

CYCLE SCHEDULE:

As the samples were received in the fall and early winter when the prevailing humidity is somewhat lower than 65 per cent, and upon receipt were stored in a constant humidity room at 55 per cent, the humidity cycle was started by adsorption to 65 per cent. After testing at this humidity, the humidity was raised to 85 per cent, the samples conditioned and tested, then lowered in 20 per cent humidity steps to 65 per cent, 45 per cent, and finally to 25 per cent, whereupon the adsorption part of the cycle was again started, and the humidity raised to 45 per cent and then to 65 per cent, thus completing a full cycle covering the entire range of humidities usually encountered in actual atmospheric conditions.

This cycle was repeated at 40, 70 and 100 deg. F.

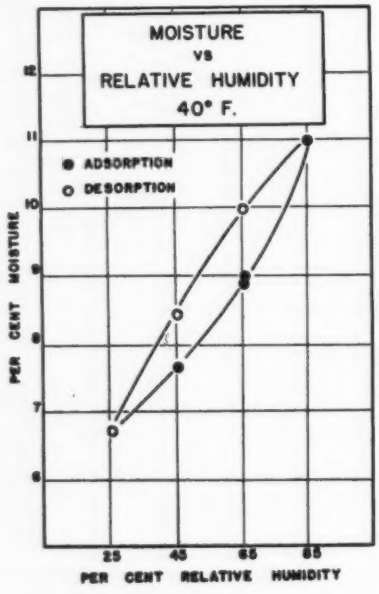
Results and Discussion of Results

RELATION OF MOISTURE CONTENT TO HUMIDITY AND TEMPERATURE

By far the most common comparison in the moisture-humidity literature is the correlation between moisture content and relative humidity.

The relations of moisture content to relative humidity as determined in this work are shown in Figs. 2, 3, and 4. The values plotted are the average moisture contents of four boards, the two jute test liners and the two solid kraft 0.016 inch boards (B, C, D, and E). The hysteresis is to be noted. This phenomenon must be recognized in its proper importance. It exists in the changes which occur every day in paper and board. It may be possible to eliminate hysteresis in the laboratory, as claimed by Hamm and Patrick (*15*), by the removal of the last traces of foreign gases from the surface of the cellulose, but it is absurd to think of commercial paper or board being so treated. The fact of the existence of hysteresis must be accepted and continually held in mind when evaluating paper characteristics which are dependent upon the moisture content.

Considering the effects of temperature on hysteresis, it is to be seen by comparison of Figs. 2, 3, and 4 that the area of the hysteresis loops does not change greatly with temperature. The actual moisture contents under given conditions of humidity, the direction of approach, and the magnitude of the humidity change are more dependent upon the temperature, as can be seen from Fig. 5. At the higher humidities the moisture content passed through a minimum near 70 deg. F., but at the lower humidities it seemed to decrease as a straight line function of the temperature. The latter behavior was to be expected, since the literature describes the water vapor adsorption by cellulose as an exothermic process. Therefore, an increased temperature should inhibit adsorption. The fact that the moisture content



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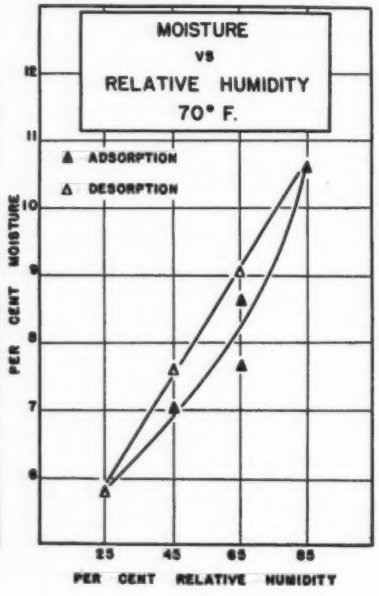

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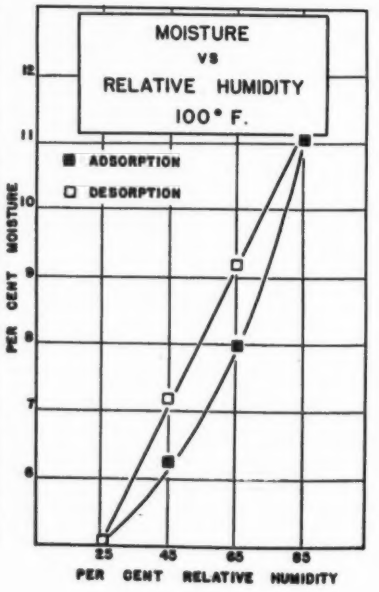

FIG. 4.

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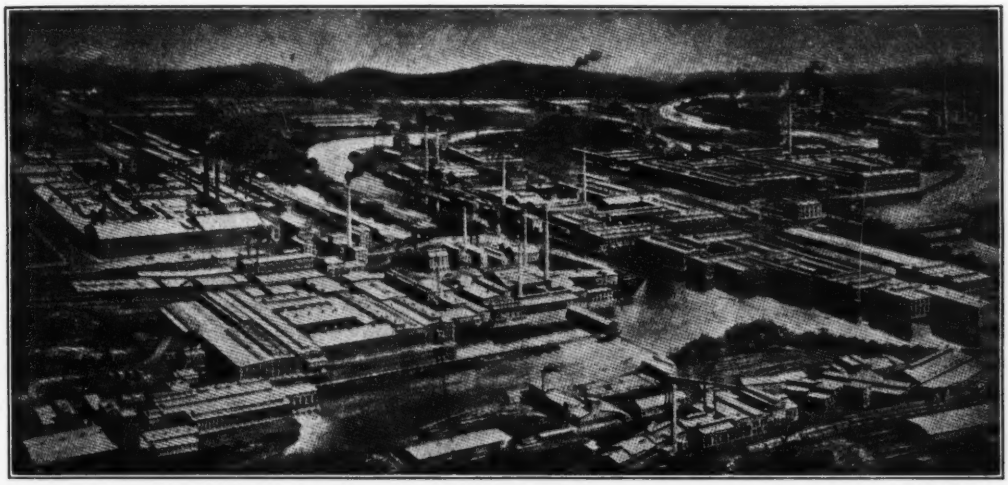

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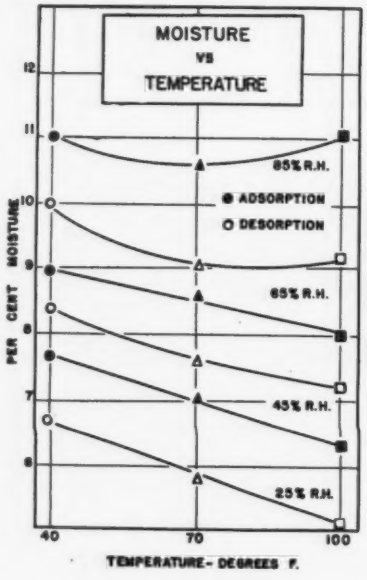

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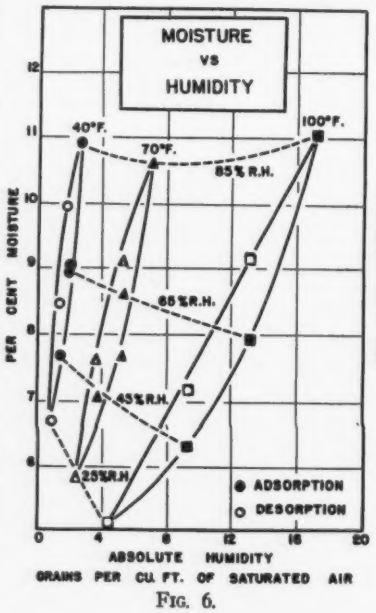

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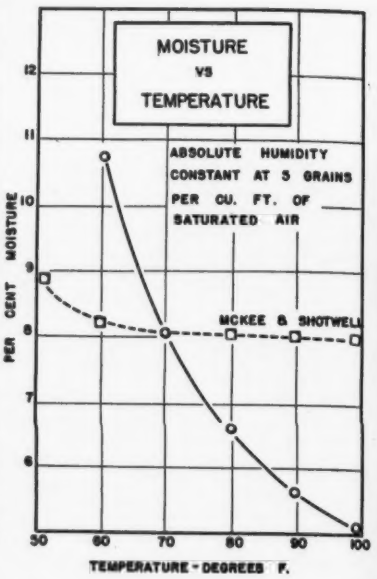

FIG. 7.

showed a minimum near 70 deg. F. was reported by McKee and Shotwell (*10*). They worked at 95 per cent relative humidity, but failed to recognize that this phenomenon was peculiar to the higher humidities.

It is perhaps better to plot moisture content against absolute humidity, as this allows the effect of relative humidity and temperature to be shown on one graph. Fig. 6 shows the average moisture contents of the four test liner type boards (B, C, D, and E) plotted against absolute humidity expressed in grains of moisture per cubic foot of saturated air. The narrow loop farthest to the left represents conditions at 40 deg. F., the middle loop, 70 deg. F., and the loop farthest to the right 100 deg. F. The lowest point in each loop represents 25 per cent relative humidity, the highest point, 85 per cent, and the two intermediate points, 45 per cent and 65 per cent relative humidity, respectively. The lines connecting the different loops represent conditions of equal relative humidity as approached on the adsorption leg, except in the case of the 25 per cent relative humidity values. This method of plotting the results again makes evident the difference in the effect of temperature at high and at low humidities.

From Fig. 6 it is impossible to explain the results of McKee and Shotwell (*10*), which correlate moisture content with temperature at a constant humidity. They reported no change in the moisture content between 60 and 110 deg. F., when the temperature was changed at a constant absolute humidity of 5 grains per cubic foot of air. They failed to specify whether the volume measurement was on dry air or on saturated air. Assuming that it was the saturated volume, which has been used in Fig. 6, the moisture contents as determined for boards were 5.2 per cent at 100 deg. F., and 8.0 per cent at 70 deg. F. However, the 100 deg. value is too high to be comparable to the values of McKee and Shotwell, because of the arbitrary closure of the hysteresis loop at 25 per cent relative humidity. If the adsorption value had been determined by adsorption from the bone-dry condition, this moisture value woul probably have been lower. But even as it is, there is a difference of almost 3 per cent in moisture content in 40 per cent less temperature range than was covered by McKee and Shotwell without any change in moisture content. A direct comparison of the values of McKee and Shotwell with the values determined for board are shown in Fig. 7. The intermediate values have been obtained by interpolation from Fig. 6.

Few definite positive conclusions concerning the influence of fiber furnish can be drawn from these moisture data. Straw A exhibited a consistently higher moisture content than the other boards, the differential amounting to about one per cent moisture. There was quite an appreciable variation among the other boards. The average spread in moisture contents of the four test liner type boards (B, C, D, and E) was 0.5 per cent moisture, but this was not regular, showing that the other uncontrolled variables had a greater effect than fiber furnish. For instance, a board containing reclaimed fibers is often very irregular in ash content. The materials which comprise the ash, being in general only slightly hygroscopic, will influence the apparent moisture content of the board containing them. It is apparent that there is no great difference in the moisture contents of jute and solid kraft boards of the test liner type at given conditions of temperature and humidity.

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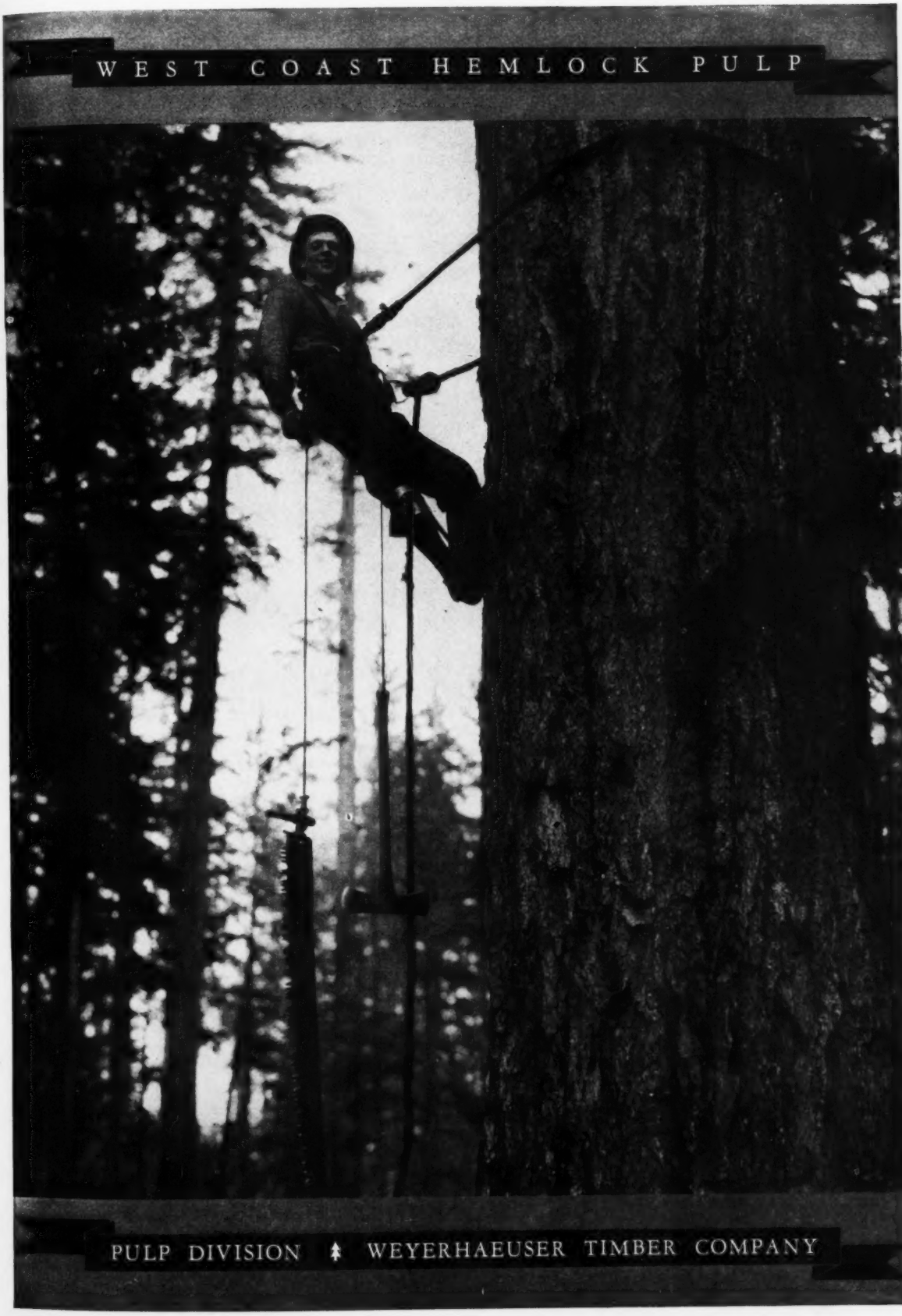
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Fly Ash Prevention*

By Stanley Brown [1]

In approaching the subject it should be recognized that if dust has value its total collection is of importance, whereas if it is merely an annoyance a character of eliminator should be employed which will best correct the nuisance range.

The subject of fly ash collection is being given widely increasing study in this country and the time is quickly approaching when all city ordinances will rule against misbehavior in this respect.

Nuisance depends upon particle sizing, combustible content and the falling of the ash upon residences, business establishments and factories. The combustible content increases with particle size and therefore the upper sizings are doubly troublesome.

In considering sizing, it should be understood that a particle of 30 microns (submesh 500) is extremely small, and beyond the visibility of most eyes. For example, the sizing of ash particles of usual annoyance on desk papers, on household linens, etc., ranges from about 60 to 200 microns.

Particles of smaller size than 30 microns have little bearing on 'neighborhood nuisance', as may be observed in the following table:

Sizing of Fly Ash Particles		Time to Fall 200 feet in Still Air	Miles of Travel (in 5-mile breeze) while falling 200 feet
Microns	Sub-Mesh		
20	625	0.715 hours	3.58 miles
10	1250	2.40 hours	12.00 miles
5	2500	9.20 hours	46.00 miles
2	6250	85.60 hours	428.00 miles

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Buell Engineering Co., 70 Pine Street, New York.

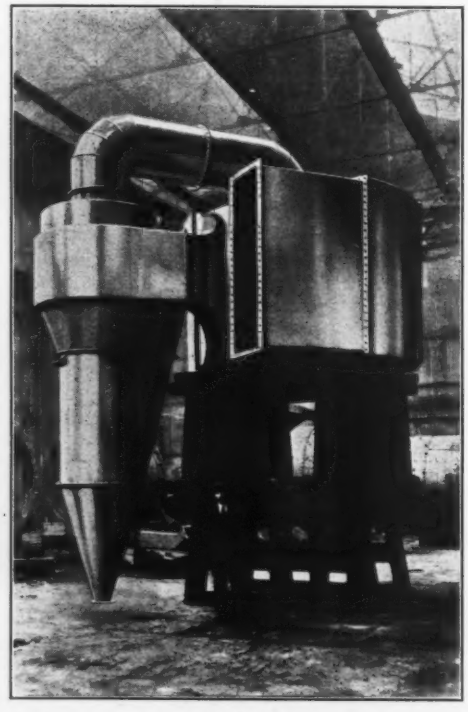


FIG. 1.

In the selection of an eliminator it is hazardous to predicate results upon the findings of polished laboratory models or experimental sizes upon the roof because vast difference may be disclosed in the operation of large size eliminators in the matter of gas distribution, control at fractional load, temperature strains, ash accumulation, as well as relative accuracy.

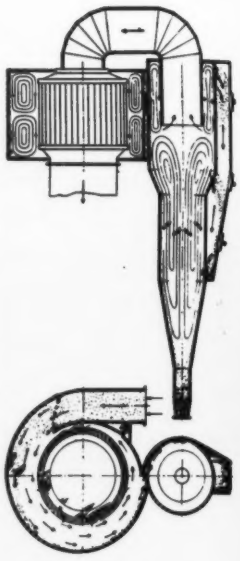


FIG. 2.

In design, due consideration should be given to abrasion. This varies with centrifugal force as expressed by the relation MV^2/r which indicates that the larger the diameter the smaller will be the attrition.

Furthermore, proper regard must be given to care of workmanship in the formation of volutes and the like, and particularly in the meetings or welds of the plates. For instance, the interiors of at least all vertical welds should be carefully ground to conform with neighboring curvatures. If this is not undertaken there will be rapid erosion of the plate area immediately following the unevenness.

Of interest relating to "uneven interiors," a recent experiment was undertaken "in an eliminator corresponding with a steam generation of 100,000 pounds per hour. The surface was smooth in the first series of tests and later irregularized by vertical ribs having radial extent of about 0.00013 of the diameter of the eliminator casing. The falling off of the efficiency due to the irregularity was 13 per cent.

Buell Eliminator

With the above thoughts in mind the Buell eliminator (van Tongeren system) has been introduced to the American engineering fraternity. Rather

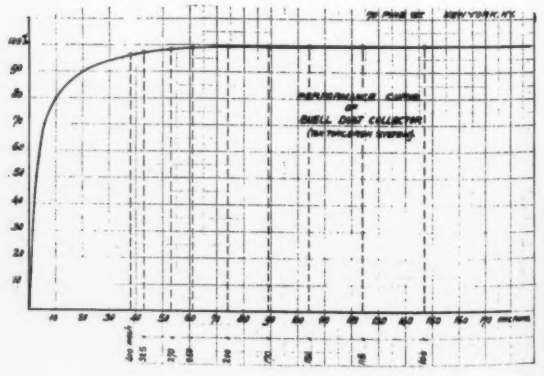
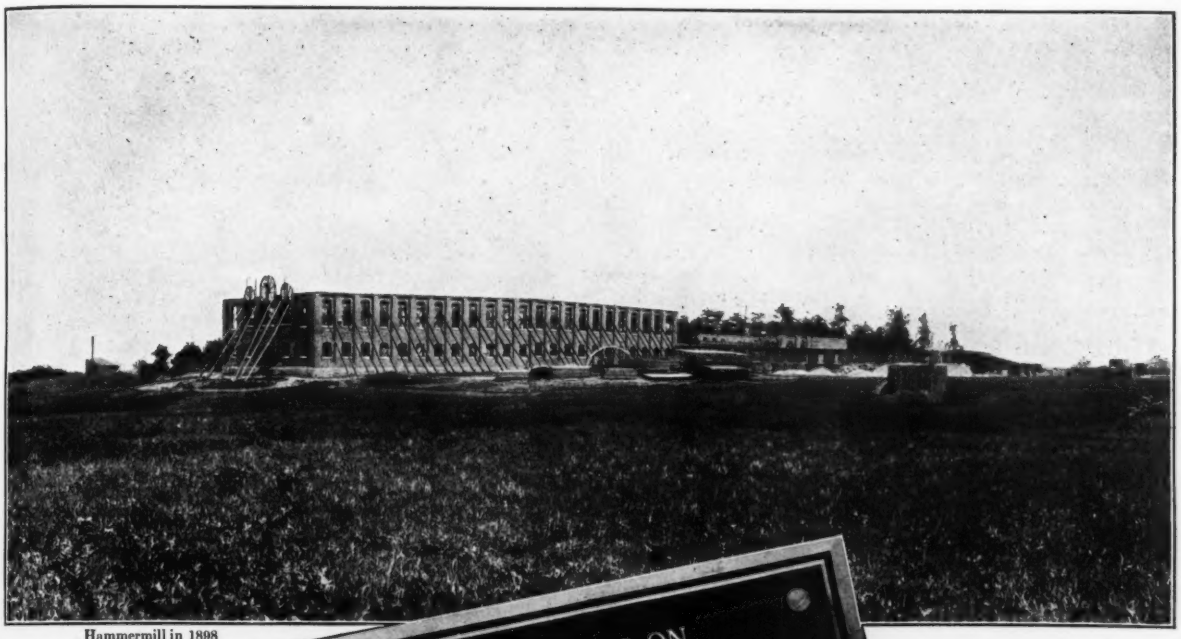


FIG. 3.



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uniquely, with respect to the prior art, the performance recommendations are based upon actual field tests of over 20 of the largest sizes of above 100 fly ash installations, where particular investigation was undertaken regarding collection in the various size-bands.

Fig. 1 illustrates the compound type of dust eliminator, comprising primary and secondary; or, differently speaking a concentrating chamber and a cyclone of unique design. The total gas to be cleaned enters the primary, the dust seeks a position adjacent to the volute casing, and is shaved off with 10 to 15 per cent of the total gas for actual collection in the secondary.

Fig. 2 again shows the compound type of eliminator, and indicates the double-eddy current flow establishment in the primary and in the secondary. It will be noted in both instances that the influence is outward at the meeting of the eddy-currents, and it is at this zone that the cleansed gas is discharged.

The cyclone is seen to be quite different from the earlier art in the features of: low position of gas-inlet to the top cylinder; low position of the mouth of the outlet pipe; by-pass dust channel; and increased ratio of overall height to diameter of top cylinder.

The provision of the above design features gives a dust concentration space above the gas inlet and permits from this zone a steady shave-off of the dust for by-pass through the outside dust channel (away from the mouth of the outlet pipe) for re-entry at the mid-cylinder in such fashion that the downward flow of the lower half of the double-eddy current promotes the travel of this dust to the bottom dust outlet.

The inlet of the primary is provided with a control damper which may be automatically positioned to maintain a uniform rim velocity.

Also, within the primary concentrator casing, adjacent to the central clean gas outlet, there is an assembly of movable vanes which have a twofold purpose: Firstly, to divert dust to the double-eddy stream for recirculation; and secondly, by their angular adjustment, to maintain an approximately constant volume of gas flow from primary concentrator to the secondary separator at all loads.

Fig. 3 shows performance curve expressing relation between particle size of fly-ash and collection efficiency. This has been developed according to the reports of independent test engineers called in by the purchasers in the matter of acceptance tests, and

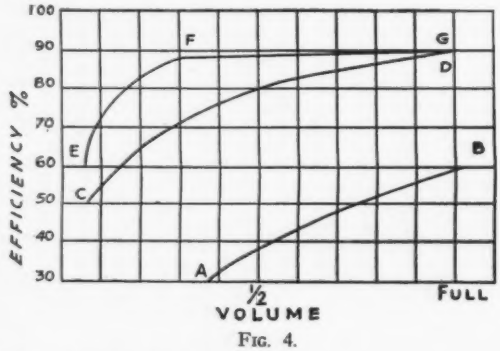

Fig. 4.

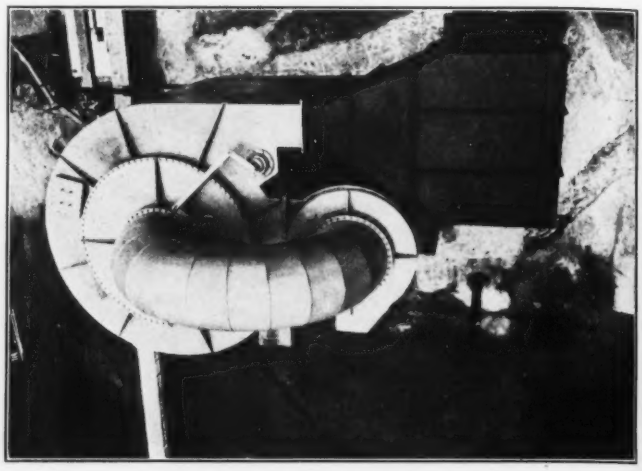

Fig. 6.

includes eliminators up to the unit capacity of 118,000 cu. ft. per min. The conservatism of this curve will be appreciated when it is known that for the 20-micron particle sizing the reported values run from 90 to 93 per cent collection efficiency; whereas those of 10-micron sizing have been reported as having collected variously from 82.4 to above 86 per cent.

The attainments of these efficiencies are available according to a draft loss of less than 1.5 inches w.g. corresponding to gas temperature of 400 deg. F.

Fig. 4 shows for the Buell eliminator the relation between total efficiency and fractional load, and for purpose of illustration a full-load efficiency value has been taken intermediate of the separate accomplishments in cases of stoker firing and pulverized firing.

The lowest curve shows the attainment with no internal vanes in the primary; the middle curve shows the relation when the internal vanes have fixed position; and the top curve shows that with movable vanes controlled in harmony with the inlet control damper the efficiency is less than 3 per cent lower at approximately 0.3 load than at peak. If correction is required at smaller fractions of load, two units may be installed (each for 50 per cent of the duty), so that one may be cut out at half-load with consequent enjoyment of approximately peak-load efficiency to 15 per cent of peak.

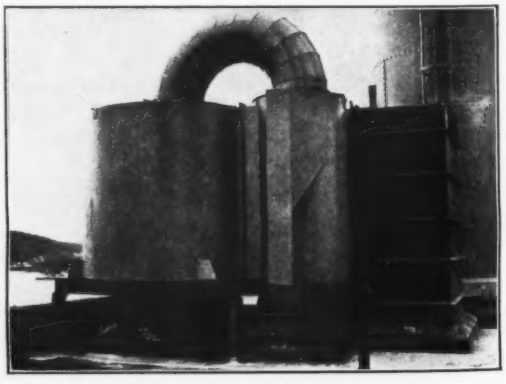

Fig. 5.

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An unusual characteristic of the eliminator is that its efficiency increases with light dust loadings, and this is of great importance in the realm of fly-ash. In experimental comparison of two cyclones, one equipped with concentration zone above its gas inlet and with outside by-pass dust channel, and the other cyclone not so equipped, at all values of dust loading the former was superior and at light loadings the improvement was quite marked.

Figs. 5 and 6 illustrate respectively elevational and plan views of the Buell eliminator for each of the two 125,000 pound boilers for a 25,000 k.w. generating set of a prominent New England station. It will be observed that the primary and top cylinder of secondary are above the roof. The gas discharged from the air heater passes through the collector in its advance to the i.d. fan which is below the roof and directly under the primary.

Of concluding interest, the guarantee as here tabulated, while distinctly conservative with reference to the design, is more than fully protective to the station.

Microns	Mesh	Collection Efficiency, Per cent
Above 44	325	97
Above 20	625	90
Above 10	1250	80

Alum: Its Use and Effect *

L. M. Booth[1]

Abstract

The object of this presentation is to call attention to the customary lack of consideration by paper makers of the function of the alumina portion of the alum which they use. Failure to appreciate the utility of the alumina content is discussed. References to water purification literature disclose efficient utilization of alum. The futility of attempting to appraise the use alum by acidity measurements is pointed out. More economical use will result from a properly balanced viewpoint of the function of alum in paper making.

Paper Maker's Alum

For a moment let us consider the composition of paper maker's alum. The commercial product is aluminum sulphate containing less water and more Al_2O_3 than the crystal, $Al_2(SO_4)_3 \cdot 18\,H_2O$. A typical analysis is as follows:

	Per Cent
Combined Al_2O_3	16.90
H_2SO_4 (equivalent)	48.80
Uncombined Al_2O_3	0.35
Fe_2O_3	0.40
H_2O	41.30
Insoluble	0.10

The water of hydration in the commercial material approximates $14.2H_2O$ for each $Al_2(SO_4)_3$. This does not conform to the formula of known hydrates which are 27, 18, 16, 12, 10, 9, 6, 3 and 2 H_2O, respectively *(1)*.

As an essential paper making chemical, the composition and influences of each of the components of alum should be better understood and appreciated. The acidity of alum serves to break down size emulsion, to harden the stock if required and to provide the acidity necessary for use with a number of dyes employed in the paper industry. The alumina content is a valuable aid in retention of rosin in sizing, filler and dyes, as well as for controlling water drainage on the paper machine. One reason for the presence of so much water of combination is to assure stability after manufacture, in order that the active ingredients may remain readily available for use.

Alum Tonnage

Of the 315,000 tons of alum distributed in 1935, *Chemical & Metallurgical Engineering (2)* estimates that 117,500 tons were used in the pulp and paper industry in the United States. Since the paper mills consume so much alum, should there not be more widespread appreciation of its alumina component?

In recent years we have heard a great deal about the undesirable influences of alum on paper making machinery and on the finished products. Consequently, efforts have been made in many mills to reduce alum consumption. Actually the complaint has arisen because of the excess acidity which has prevailed. We believe that, when the diverse functions of the components of alum become better understood, the paper industry will be using more alum rather than less. Recently the use of alum has been advantageously extended to grades in which it was not heretofore thought to be applicable.

What About the Alumina?

The mention of alum as an item of beater furnish is quite prevalent in paper making literature. Frequently, proper analysis of these data cannot be made because the two individual factors, namely, alumina and acidity, which are likely to exert controlling influences, are not differentiated and described.

For example, an investigator who employs alum will tell of his success in clay retention, rosin sizing, or what not, stating that the work was done under conditions which yielded various pH values and let it go at that. With only this meager information, about the solution in which the work was done, we are still in a quandary. The ultimate fate of the alumina, as well as the acid radical of the alum, needs to be determined in order to evaluate the investigations.

Surely it is reasonable, when reading technical reports in this field, to expect a balanced chemical accounting. In appealing for this information about alumina we are merely inquiring as to the whereabouts, the condition and the influence of a well known inorganic substance. In case the circumstances are such as to place obstacles in the way of rendering a balanced account, an explanatory statement should be made. The influences of the alumina should not be ignored.

The fact that there is no reliable simple test for

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1937.

[1] Member TAPPI, President, Booth Chemical Company, Elizabeth, N. J.

alumina, which can be made as easily as a pH determination, may be the reason for this lack of information. This, of course, is merely a poor excuse which will seem even poorer when the paper industry realizes more fully the importance of alumina. Improved testing technique is needed.

Clay Retention Examples

Albert *(3)* records work of the Finnish investigator, Roschier, who "made up his furnish and then neutralized part of the alum with dilute caustic soda before adding the clay. Even with the alum constant, pH has a decided effect on retention," as shown below in terms of percentage.

pH	4.4	4.45	4.47	5.15	5.6	6.35	6.7	7.1
Retention	36	38	45	50	52	53	55	51

Albert's expression " . . . . pH has a decided effect on retention . . . ." has a familiar ring which is reminiscent of the common confusion of effect for cause. Many paper makers talk about pH as if it were an item of the furnish and having a causal influence. Besides, they do not seem to realize that a whole tank car of sulphuric acid has the same pH as a single drop of its contents. Under no circumstance is pH a cause; it is merely a measure of a single attribute of the effect produced by the acid component of alum, plus the acidity of alkalinity of other substances present in the solution.

The maximum clay retention reported by Roschier was at pH 6.7. In this instance, with uniform use of alum, we have a series of pH and retention values. Surely in the absence of other test data we are not justified in assuming that the intensity of acidity, as measured by pH values, is the sole and fundamental characteristic to be considered. The alumina precipitate, which was undoubtedly formed, was not credited with its share of the work.

It is to be noted that Roschier added the alum and caustic soda before adding the clay. Presumably this was done at beater consistency, in which case he was using what was little better than a preformed alumina precipitate to enhance retention in the sheet. As a result of water treatment experience, both in water works practice and with dilute stock suspensions in paper machine operation, we would expect that greater benefit would have been derived from the coagulating precipitate if it were made after the addition of the clay and preferably at a time of maximum dilution of the stock. A coagulating precipitate is invariably most beneficial if formed when maximum dilution prevails. Proper timing and mechanical influences are desirable.

Schwalbe *(4)* records other work of Roschier, wherein alum was used as a coagulant for increasing the retention of mineral filler. The author states that the best results were obtained at pH 5.5. In this instance tenth normal sodium hydroxide solution was used in amounts which were substantially equivalent to the alum used in the series.

Per cent Alum	pH	Percentage Filler Retention: 10 Per cent Filler Added	Percentage Filler Retention: 20 Per cent Filler Added
0	...	32	33
1	5.65	29	30
2	5.60	45	40
3	5.50	50	..
4	5.60	53	55
5	5.60	58	..
6	5.50	63	67
7	5.70	71	71

The table shows that there was a gratifying increase in clay retention with increasing amounts of alumina precipitate which presumably was formed. This time while increasing filler retention Roschier did not merely increase the percentage of alum in the series. He took pains to see that the alumina became effective and that the intensity of acidity did not increase. It will be noted that in this instance Roschier found a different optimum pH point from that used in his other work cited by Albert. *(3)*

This table also shows that when only one per cent of alum was used there was less of filler retained than when no alum was used. This phenomenon is not unusual when alum is used as a coagulant.

Alum in Water Purification

The classic work of Theriault and Clark *(5)* is especially illuminating in this connection. They investigated the efficiency of alum coagulation from the standpoint of minimum time of precipitation. They found that the optimum pH value for alumina precipitation is approximately 5.5. Their work was done with aluminum sulphate and solutions of sodium hydroxide and calcium hydroxide under laboratory conditions. Since these conditions do not prevail in the paper mill, it is desirable to ascertain the optimum pH value of each paper making operation wherein alum is used. Theriault and Clark state: "The hydrogen-ion concentration of the final mixture of water and alum is of fundamental importance in the formation of floc."

After the optimum precipitation point for the alumina floc is known the next step is to ascertain how much of the floc is needed to accomplish the desired effect. Uniformly good results in practice are not possible unless both favorable pH range and suitable quantity of floc are assured.

Coagulation of Great Lakes Water

Hatfield *(6)* in Michigan, made a study of the behavior of alum in water purification using Lake St. Claire water and determined that "The apparent iso-electric point is at pH 6.1 to 6.3." He further states: "The differences between Clark's *(5)* and these results are probably due to the impurities of a natural water with its dissolved neutral and buffer salts, turbidity and organic matter." Continuing, Hatfield states: "From the standpoint of residual alum in the effluent of the Highland Park Plant, it is quite clear that the minimum allowable dose is about 0.6 grain per gallon of alum. More alum than this minimum is sometimes necessary to remove the high turbidities."

This is a typical example of what is well known to filter plant operators, namely, the fact that it is futile to use less of alum than the job requires. They also know that the effect of the use of alum is frequently not in proportion to the amount used. The effort expended in determining the proper quantity to be used is invariably justified by improved results and economies.

Quoting from Hatfield *(6)*, "Hatfield *(7)* has shown that reasonably good coagulation of a water of variable alkalinity always begins at a pH value of 7.6 to 7.8, providing the original pH of the water was higher than 7.8; also that this coagulation point was independent of the turbidity. He found that the most efficient point to operate the Highland Park Filtration Plant was at a pH value of 7.2." In his ac-

counting for Al_2O_3 Hatfield used the procedure of "Standard Methods of Water Analysis." *(8)*

Highly Colored Soft Water

Norcom *(9)* when working at Wilmington, N. C., with water from the highly colored North East Branch of the Cape Fear River, encountered a set of circumstances which were entirely different from those met by Hatfield. Norcom dealt with a water which had a high content of organic coloring matter. He reported that optimum results in decolorizing the public water supply at Wilmington occurred at a pH very near 4.4. He remarks: "It should be stated that there is always a minimum value of alum below which complete decolorization cannot be obtained. This is to be expected since there must be at least sufficient alum present to completely react with the color if complete precipitation is to be attained."

Norcom's experience in coagulating color-producing organic matter in water is analagous to the necessity of using an adequate amount of alum to set rosin size.

Acid Not a Substitute for Alum

In a private communication, Norcom stated that at Wilmington he made extensive studies to determine if it were possible to substitute acids for a portion of the alum. He found it necessary to use alum to supply the alumina required to combine with the organic substances of the water. Mere acidity was not helpful. His conclusion, that alumina is needed to combine with the organic matter, closely parallels paper making experience in rosin sizing where the futility of depending on the acidity of white water, as a substitute for alum, is recognized.

Alum in Paper Making

Frequently, when paper makers need more alumina in the system they add more alum without considering how the alumina is to be precipitated and thus to become of service. Whenever alum is added the sulphates are increased at nearly three times the rate at which the alumina. That is, for each 17 parts of alumina added, the sulphuric acid equivalent is being increased by 49 parts.

Each of the components of alum, namely the alumina and acidity, exercise independent functions. Under some circumstances the ratio of alumina to acidity which prevails in the solution permits them to cooperate for maximum benefit. On the other hand, the ratio of the components present may not be economically useful. Often the net effect of the addition of more alum runs counter to the paper maker's purpose, for the reason that an excessive quantity of acidity hampers sheet formation. Almost invariably, where difficulties arise from the use of too much alum, they are due to the presence of excess acidity. Too much of alumina, rarely, if ever, occurs in the water suspension of the stock.

There are two reasons why acidity builds up in the paper making system. One is because of the selective action of the cellulose in adsorbing the alumina portion of the alum. Besides, the excess alum which has been furnished and not decomposed contributes its increment of acidity. For closed system operation definite steps to limit acidity should be taken.

Dependence on pH Data

It seems to be the custom, after adding alum to a paper making system, to consider no analytical data except the pH values at which the pertinent phenomena occur. In paper mill practice it should be remembered that pH measurements are not quantitative for weights or volumes of acidity or alkalinity. Far too much faith is apparently placed in the pH test when evaluating the key characteristics of the solutions with which paper makers are dealing. Frequently pH test data are misleading. As interpreted, in many cases, such information tends to set up a false sense of security. On the other hand, when considered along with adequate supporting information, pH data are invariably helpful. One item of supporting information, which may be easily determined by titration, is total acidity or for alkaline solutions, the alkalinity. At the 1932 Fall Meeting of TAPPI, attention was called *(10)* to the desirability of making quantitative acidity tests when apparising water quality in paper making.

More Information Needed

Titration and pH tests, in the absence of supporting data, do not tell what has become of the alumina portion of the alum. We should know if it has been precipitated and also about the amount, if any, which remains in solution.

When it comes to appraising the behavior of a water suspension of stock it must be realized that a wide variety of factors govern. The performance of the forming wire, which invariably acts in accordance with the laws of nature, is influenced not only by the few factors, which are customarily taken into account, but also by a host of others the importance of which most of us are still unmindful. Instead of relying on the usual fragmentary chemical test data pertaining to wet end operation, we should give more attention to the little appreciated influences of the various items of the furnish and the conditions of operation. If this were done some of the apparent complexities of paper making would disappear.

An increased demand for fundamental data will naturally result in the development of suitable indicating and recording instruments in order to evaluate and control wet end performance. The familiar array of indicators and recorders, to be found in the modern steam and electric generating plant, encourages the hope for similar development for the wet end of the paper machine of the future. At present, although the volume of materials handled is many times as great as at any other point in the paper mill, the wet end is still "no man's land" for the instrument maker.

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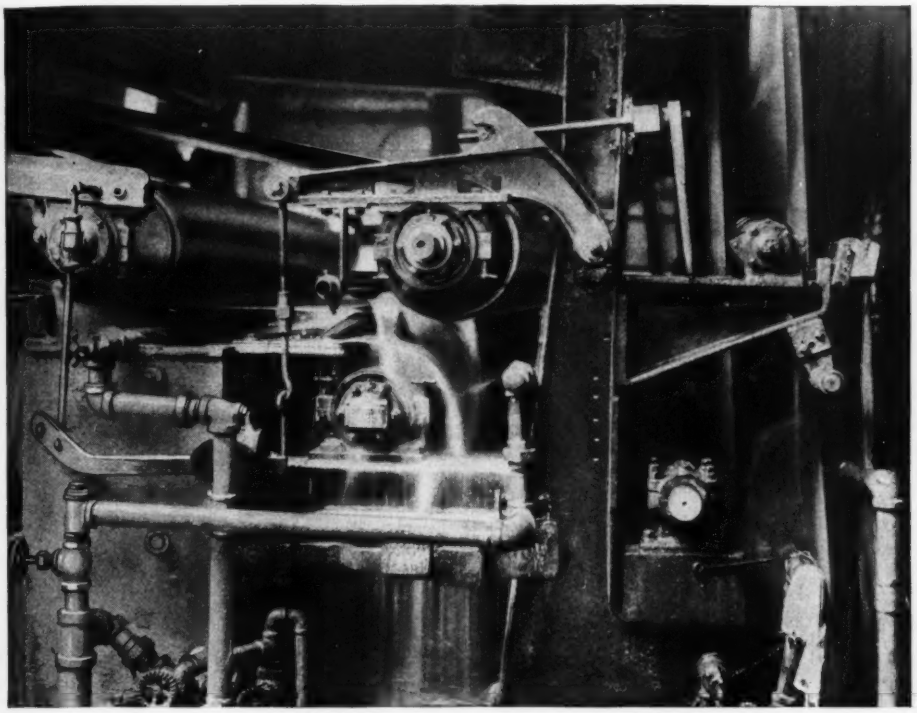
The Value of Experience . . .



Downingtown Extractor Units on Board Machine. Two top rolls rubber covered by Manhattan. Photo courtesy Downingtown Manufacturing Company.

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Developments in Multi-Stage Bleaching of Wood Pulp*

By M. W. Phelps and John Schuber[1]

The evolution of pulp bleaching practice during the past ten years has been a progressive development from original single stage methods to multi-stage processes of increasing complexity. Demand for bleached pulps of maximum brilliance and strength, produced at economic cost, has been the major factor in promoting this development.

As a result of proven research in laboratory and plant, specific information is now available on the type and sequence of bleaching treatment best adapted to furnish these desirable pulp characteristics. The selection of a specific process is determined not alone by the ultimate behaviour values desired in the bleached pulp; of equal importance, is the ease or difficulty with which the residual impurities in the fiber lend themselves to removal or decolorization. For this reason, sulphite pulps may be bleached to a high white with good strength characteristics by a three stage system, whereas kraft pulps require four or more stages to effect satisfactory bleaching.

The pulp bleachability values associated with the nature of the cooking process are in themselves capable of considerable variation. These variables are mainly, selection of wood species, cleanliness of the prepared wood, cooking procedure within defined limits, and efficient screening and washing of the cooked pulps. By control of these factors, it is possible to furnish the bleachery with a strong, easy-bleaching pulp that will retain the desired paper-making values throughout the bleaching process.

Since the cost of removing a unit weight of lignin is substantially less in the digester than by means of chlorine in the bleaching process, it is more economical to cook to an easy bleaching kraft than to attempt bleaching a hard, raw pulp. Study of the alkali concentration, component ratios, temperatures and liquor circulation are therefore profitable in establishing the optimum cooking conditions for an easy bleaching pulp of strength equivalent to the harder kraft normally produced for unbleached paper.

Modern practice in multi-stage bleaching utilizes three essential treatments defined as chlorination, caustic extraction and hypochlorite stages. Numerous combinations are possible by varying the concentration, temperature, sequence and time with which these treatments are applied to the pulp. However plant investment and bleaching economy usually limit these variables to definite combinations adapted to produce optimum results with the specific character of the pulp under treatment. These combinations have been evaluated from extensive study of all bleaching variables, which will de duscussed in greater detail later in this paper.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Members TAPPI, Technical Service, The Solvay Process Co., Syracuse, N. Y.

Chlorination

The mechanism of the chlorination reaction varies with the hydrogen-ion concentration (pH) of the chlorinated stock. Under conditions where the major percentage of a high bleach demand is added as elemental chlorine, the pH values at pulp consistency of around 3.5 per cent may range from 1.0 to 2.0. When a lower percentage of chlorine is added at relatively low pulp consistencies, e.g., 40 per cent of demand at 3.5 per cent consistency, pH readings from 2.0 to 3.0 are usually found to occur.

With this change in pH concentration there is a concomitant change in the dissociation constant of the dissolved chlorine. In the range of pH 1.0 to 2.0, the value of the equilibrium constant K in the reaction—

$$K = \frac{(H^+)\ (Cl^-)\ (HOCl)}{(Cl_2)} \qquad \text{(Equation 1)}$$

becomes very small, indicating the dissolved chlorine is present principally in the molecular, undissociated form. Under these conditions the chlorination process proceeds preferentially by additive reaction in the double linkage of the lignin complex side chain, and secondarily in substitutive reaction whereby hydrochloric acid is formed. At pH values 2.0 to 3.0, dissociation into hydrochloric acid and hydrochlorous acid occurs with increasing rapidity, reaching its maximum at pH 5.0. At pH values near the lower limit (pH 2) chlorination reaction proceeds chiefly by substitution, and toward the upper limit (pH 5) by substitution and oxidation of the lignin residues of the pulp.

The nature and economy of the pulp chlorination process therefore are dependent to a large extent on the concentration of the initial chlorine addition. The additive reaction uses chlorine most efficiently since none is lost as hydrochloric acid, and the resultant chlorinated lignin is removed by partial hydrolysis in the caustic extraction stage. Useful work is also performed by the substitution reaction in that the major part of the lignin is thereby rendered water soluble, or so altered that it may be removed in the later bleaching stages. Oxidation in this stage is not desirable, due to secondary reactions consuming chlorine in wasteful oxidation of already chlorinated lignin. Chlorination pH values should therefore be as low as process equipment, bleach demand and pulp cleanliness will permit.

The temperature of the chlorination stage is also of importance in affecting pulp quality. Jakowkin *(1)* had found that the hydrolysis constant K, (Equation I), varies markedly with the temperature. At 10 deg. C. (50 deg. F), $K=2.6 \times 10^{-4}$; at 26.7 deg. C (80 deg. F), $K=5.1 \times 10^{-4}$; and at 37.8 deg. C (100 deg. F), $K=6.7 \times 10^{-4}$. This indicates that HCL and HOCL concentrations are increased nearly three fold by raising the temperature from 50 deg. to 100 deg. F.

Experimental data on kraft pulp chlorination dis-

closes the harmful effect of high temperature chlorination. Fig. 1, presenting strength-temperature data on beaten kraft pulp after the chlorination stage, furnishes an indication of the loss in paper making strength consequent on chlorinating at an elevated temperature.

The chlorinated lignin products formed in the direct chlorination stage may be roughly differentiated into three classes. The major constituent is a type of water soluble lignin chloride, which permits of ready removal in the acid state by washing the pulp. In lesser amounts two general types of water insoluble lignin chlorides are also formed, and these two classes adhere as insoluble residues on the washed fiber. One type of residual lignin chloride is soluble in alkaline media, but the most resistant type is insoluble in either water or alkali, until it has been oxidized in a hypochlorite bleach. Additional residues, particularly in kraft pulps, are sulphur dyes and phlobotannins which are frequently retained in substantially unaltered form by the washed, chlorinated pulp.

Caustic Extraction

The general purpose of the caustic extraction stage is to dissolve the water insoluble residues forming an integral part of the washed chlorinated pulp. The alkali found best adapted to produce the maximum solubilizing effect is caustic soda.

The use of lime, either added to neutralize chlorinated pulp in its liquor, or as a reactant in the extraction stage proper, precipitates insoluble lime salts in and on the chlorinated fiber. The amount of insoluble lime precipitate increases markedly as the pH value of the chlorinated liquor rises above neutrality. Fig. 2, illustrates the amount and dark color of the lime precipitate. Sample 1 in Fig. 2, shows the residue remaining on a filter paper after 200 c.c. of chlorinated liquor has passed through. Sample

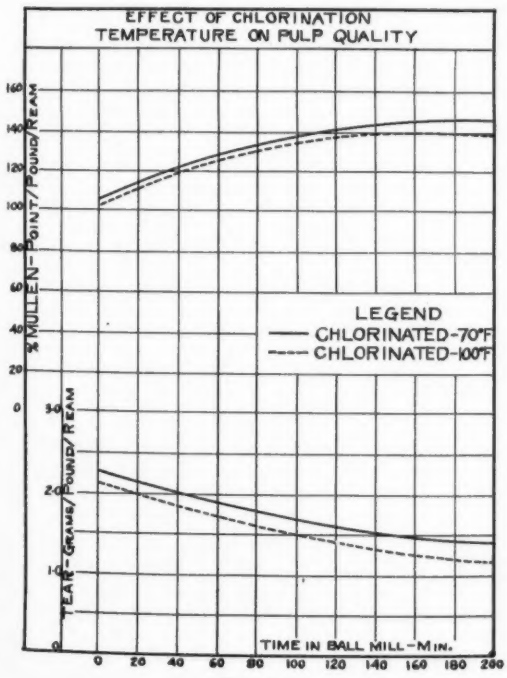

FIG. 1.

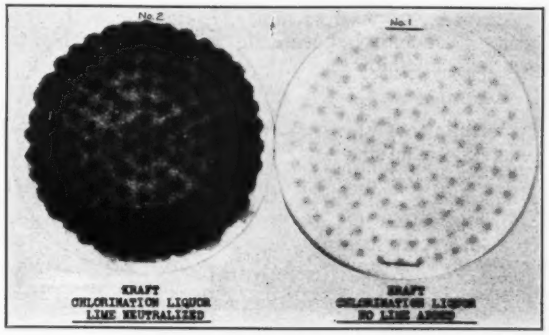

FIG. 2.
Effect of Lime Addition to Chlorination Liquor

2, in the same Figure, illustrates the insoluble lime precipitate remaining on the filter paper after 200 cc. of chlorinated liquor has been made alkaline with lime and filtered.

Bleach demands of the precipitate itself have indicated a chlorine consumption, in the form of hypochlorite, as high as 160 per cent. It is often sufficient to make a substantial difference in overall bleach consumption. Even with this high consumption it was found that the final color of the precipitate was a yellow shade impossible to bleach white. It is obvious therefore, that presence of the insoluble limelignin chloride residue in pulp undergoing bleaching will not only increase the bleach consumption but also prevent attainment of the best pulp color.

The amount of caustic soda normally required for solution of the alkali soluble residues varies from 0.5 to 1.5 per cent on the o.d. pulp basis. With easy bleaching sulphites, 0.5 per cent is usually all that is necessary, whereas hard bleaching kraft pulp may consume the entire 1.5 per cent of caustic soda added in the extraction stage. Temperatures of the extraction stage need not be greater than 110 to 120 deg. F., unless the aim is to produce an unusually high alpha-cellulose pulp. These temperatures are conditional in maintaining a consistency of 15 per cent or higher. Low stock density results in appreciable retardation of the solubilizing effect, and either temperature or alkali usage or both must be increased for equivalent results.

Increased caustic concentration and temperature in the extraction stage introduce proportional solution of hemi-cellulose with increase in the alpha-cellulose content of the pulp. It is therefore possible to purify the bleached pulp to any degree of alpha-cellulose content up to about 97 per cent. This degree of pulp purity is not usually necessary for paper making purposes.

Hypochlorite Stages

The pulp from the caustic extraction stage exhibits only a slight improvement in color over that of the original unbleached. There are still present appreciable quantities of residual lignin, lignin chlorides and other colored substances. These residues are amenable to oxidation, and change thereby into compounds soluble in water or alkaline media. The primary purpose of the final hypochlorite stages is an oxidation reaction with these pulp impurities. Consideration therefore, of the factors affecting the oxidating properties of calcium hypochlorite are of importance.

According to Opfermann *(2)*, the partial hydrolysis of calcium hypochlorite in the bleach liquor, proceeds as follows:

$$Ca(ClO)_2 + 2H_2O \rightarrow Ca^{++} + 2\,OH^- + 2\,HClO \qquad \text{(Equation 2)}$$

Dissociation of the hypochlorous acid occurs as a reversible reaction.

$$HClO + OH^- \leftrightarrows ClO^- + H_2O \qquad \text{(Equation 3)}$$

The hydrolysis constant therefore, is established from the relationship.

$$K = \frac{(HClO)\ (OH^-)}{(ClO^-)} \qquad \text{(Equation 4)}$$

Temperature increases the value of the hydrolysis constant, the amount of dissociation nearly doubling with an increase of 10 deg. C. Increase in concentration on the other hand results in the hydrolysis constant being depressed as a consequence of increasing the relative value of the hypochlorite-ion.

Kaufmann *(3)* considers an activator necessary for the optimum oxidizing effect, which should be the main objective in hypochlorite bleaching. Neither the hypochlorite-ion ClO- nor hypochlorous acid HClO are considered strong oxidizing agents without the catalytic effect of the hydroxyl OH-, radical. In the hypochlorite stage, the reaction should proceed according to the following equations:

$$HClO + ClO^- \rightarrow ClO + Cl^- + OH \qquad \text{(Equation 5)}$$

$$ClO + ClO^- + OH^- \rightarrow 2Cl^- + 2O + OH \qquad \text{(Equation 6)}$$

$$ClO^- + OH \rightarrow ClO + OH^- \qquad \text{(Equation 7)}$$

The OH- ion is therefore most important in effecting the purely oxidation reaction of the hypochlorite. During the reaction OH- ions are continuously regenerated, as indicated by equation 7 above, and oxidation proceeds progressively with consumption of hypochlorite.

However, during the bleaching of pulp oxidation products are formed which tend to reduce the hydroxyl ion concentration and the bleach may become acidic. The addition of alkali at this stage is therefore of advantage; since, although the hydrolysis of $Ca(ClO)_2$ (Equation 2) is depressed, the higher concentration of OH ion results in a steady oxidizing reaction throughout the hypochlorite stage.

In this connection, the following table *(4)* is of interest in showing the effect of pH values on the nature of the decomposition products of calcium hypochlorite.

TABLE I

pH	Per Cent Available Chlorine present as ClO⁻	HClO	Cl_2
1	....	20	80
2.7	....	92	8
4.6	0.2	99.7	0.1
7.0	30	70	....
9.0	98	2.2	....
10.2	99.8	0.1	....
11.2	99.99	0.01	....

It has been demonstrated by bleaching experiments that pH values of 6.0 to 7.0 in the hypochlorite stage produce the most severe attack on pulp fiber. Although the chemistry involved is not clear this reaction probably is associated with the presence of the hypochlorite (ClO-) and hypochlorous acid (HClO) components in some more or less specific ratio. The catalytic effect of the HClO component on the rate of calcium hypochlorite decomposition probably reaches its maximum in the range pH 6.0 to 7.0. The addition of alkali to the hypochlorite bleaching stage is therefore doubly important in not only preserving a steady oxidation reaction, but to avoid the dangerous limits of pH where degradation of pulp quality may occur due to over-oxidation.

Sequence of Stages

Consequent on the oxidation reaction, residual lignin chloride and color bodies are rendered partially soluble in water, and soluble to a still greater extent in caustic soda solution. It is therefore advisable to remove these oxidized impurities by a caustic extraction stage prior to subjecting the pulp to further hypochlorite treatment.

The following sequences are representative of the ways in which the bleaching steps have been applied in multistage systems:

(1) Chlorination-hypochlorite-caustic extraction-hypochlorite
(2) Chlorination-caustic extraction-chlorination-hypochlorite-caustic extraction-hypochlorite.

The disadvantage of the system indicated by Example (1) above is that increased chlorine consumption occurs in oxidation of the alkali soluble impurities retained by chlorinated pulp. The system shown in Example (2) above, produces the desired results of high pulp color and chemical economy, but has the disadvantage that another stage is introduced in the process. This additional stage involves heavy expenditure for equipment, increased maintenance, and higher power and labor costs.

However, research covering this phase of bleaching indicates that a caustic extraction and the primary hypochlorite bleach can be combined in one stage. In this manner, all the specific advantage discussed above can be obtained in a four stage system without the necessity of adding extra tanks, washers, and other equipment. This new method consists of the following sequence:

(3) Chlorination-caustic extraction-hypochlorite combined with caustic extraction-hypochlorite.

In effect, the proposed method is a five stage system combined in four stages. Laboratory investigation shows conclusively that this procedure results in kraft whites of unusual quality, which retain in the bleached pulp the desirable strength characteristics of the unbleached pulp.

We cite the following data illustrating the application of the foregoing principles to the economical bleaching of kraft pulp to high whites and excellent strengths.

TABLE II

	First Stage	Second Stage	Third Stage	Fourth Stage
Consistency (per cent o.d.)..	3.5	15	15	8
Temperature (deg. F.).....	60	110	95–110	95
Chlorine as gas (per cent of demand)	60	....	.....	....
Chlorine as hypo (per cent of demand)	....	....	30	10
Caustic extraction (per cent)	....	1.5	1.0	....
Effective time (minutes)....	60	60	30–45	120

The first stage consists of chlorination with gaseous chlorine or chlorine water in either continuous or batch units. Substantial exhaustion of the chlorine occurs in about 60 minutes, and the pulp is thoroughly washed.

Caustic extraction in the second stage is performed at high consistency to obtain maximum solubilizing effect with minimum consumption of alkali. At 15 per cent consistency, the temperature need not be over 110 deg. F. to accomplish solution of the extractable materials in this stage. After about 60 minutes retention time, the pulp is thoroughly washed.

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The third stage is a high density hypochlorite bleach at a temperature of about 95 deg. F. Alkali carry-over with the washed stock is usually sufficient to maintain alkalinity throughout the bleach. About 30 minutes of effective bleaching time is normally required to reduce the chlorine residual to a few tenths per cent. At this point, caustic soda solution in amount equal to about one per cent NaOH, basis o.d. pulp, is added and the temperature raised by direct steaming to 110 deg. F. The caustic extraction is allowed to proceed for about 45 minutes. The pulp is then thoroughly washed.

Final purification is effected in a fourth stage hypochlorite bleach. Consistency is adjusted to approximately 8 per cent, and the amount of chlorine applied kept at a minimum to reach the desired color. Temperatures are kept low and sufficient time allowed in this stage to permit a gentle, thorough solution of the residual impurities. The bleach is buffered to a pH of 8.5 or higher, by the addition of soluble alkali as required.

A small residual chlorine content is retained in the pulp at the finish of the bleach. The pulp is then acidified on dilution with either chlorine water or sulphurous acid to a pH of 6.0 to 6.5. Final washing is then very thoroughly done with fresh clean water.

The system briefly detailed above may be modified to suit mill preference or equipment. Under certain conditions, the sequence of stages may be altered in the following manner:

(1) Chlorination-hypochlorite-caustic extraction-hypochlorite.
(2) Chlorination-caustic extraction-hypochlorite-caustic extraction-hypochlorite.

Method 1 may be applied to easy bleaching kraft, hard bleaching sulphite or semi-sulphate pulps. Method 2, illustrates a five stage system which in reality performs six stages of treatment since the auxiliary caustic extraction is combined with the first hypochlorite stage. This system will produce a bleached kraft of unusually high quality, but the plant is rather costly to build and operate. Some European mills bleach with as many as six separate stages, but this practice has not yet been adopted on this continent.

Sulphite pulps do not require as many stages in bleaching as do kraft pulps to secure favorable results. Modern practice has been established on a three stage system involving chlorination-caustic extraction-hypochlorite. These three stages, with controlled alkalinity in the hypochlorite phase, have given entire satisfaction in mill practice. With hard pulps the relatively severe attack in a three stage system may impair pulp strength, and under these conditions more favorable results will be obtained in a modified three stage or four stage system, such as discussed above.

Literature Cited

(1) Jakowkin, *Zeit. f. phys. chemie* 29, 613 (1899).
(2) Opfermann, E., Die Bleiche des Zellstoffs, Part 1, 74, (1935).
(3) Kauffman, *Ber.* 65, 179 (1932).
(4) *Rayon Record* 8, 179 (1934).

Container Testing Standards*

Report of the TAPPI Container Committee, By J. D. Malcolmson, Chairman[1]

It is generally conceded that the present standard testing methods of the Technical Association of the Pulp and Paper Industry are in a rather complete from and the result of an enormous amount of cooperative effort. The proof of this is the widespread use of these specifications as well as the frequent references to them in the literature.

A careful study of these specifications will also prove that they refer almost entirely to paper rather than to paperboard. It is only recently that a serious consideration of paperboard has been instituted in our Association and this in spite of the fact that paperboard accounts for almost half the tonnage of paper produced in this country.

When the Container Committee was first appointed, it was felt that paperboard testing might very well go along with the present standards plus a few new specific tests for evaluating finished containers. The work of this Committee during the past two years has clearly shown, however, that paperboard speaks a dialect of its own and requires certain modifications in existing standards. Just as an example, ream weights have to be changed to bundles, pointage or pounds per thousand square feet.

The Committee also found that there is a healthy and divergent set of opinions in the container industry as to just how certain specific tests should be carried out. For instance, we have so far been unable to agree upon a uniform method for making rigidity and compression tests, nor even to propose alternate methods at this time.

We have, therefore, decided to postpone the more controversial tests, in order to have something at least to report at this session, and have accordingly concentrated on the following five of the more fundamental standards;

1. Conditioning of container board.
2. Thickness of container boards.
3. Basis weight of container board.
4. Bursting strength of container board.
5. Bursting strength of corrugated container board.

Even here, we have encountered much difference of opinion, not only in the industry, but even among the members of the committee themselves. Thus, in the first standard, *Conditioning*, some interests are in favor of reporting moisture content only, while others prefer to condition the containers at a constant relative humidity. Here again the committee is about evenly divided between 40 and 65 per cent relative humidity and this division is also present in the industry itself and among the container users. Perhaps eventually we may be able to compromise on some middle ground such as 50 per cent.

While these differences are pleasing evidence of earnest study and out-spoken opinions, they are not conducive to definite and acceptable standards. Nevertheless, it was thought best to submit them now as strictly tentative standards in that they may inspire comments from other members of the Association. Probably by next year we will be prepared to recom-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Technical Director, Robert Gair Company, New York, N. Y.

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ment considerable revisions if not more unanimous opinions.

Bursting Strength of Combined Corrugated Container Board

In general the specification for bursting strength of container board will conform to Tentative Standard for Determination of Bursting Strength of Container Grades of Paperboards and Built-Up Solid Fibre Container Boards. The testing of *solid fiberboard* for bursting strength offers no problems. *Double-faced corrugated* board, on the other hand, because of its more complicated structure, requires special treatment.

CLAMP PRESSURE

If the clamp is brought down as hard as possible on double-faced corrugated board, the internal structure is so mangled that the outer liners are weakened, and an abnormally low test will result. If on the other hand too light a pressure is used, the liners will break separately with what is commonly known as a "two-pop" or "double-pop" test, also resulting in abnormally low readings. Therefore, it is recommended that the clamp be brought down hard enough to leave a distinct impression on the outer liner, but no harder. If double-pop tests still result they are to be disregarded in calculating the average. In testing *double-strength board* (sometimes referred to as "double-wall") it is usually necessary to use more clamp pressure than on double-faced board in order to prevent double pops.

LOCATION OF TESTS

All individual tests on corrugated board to be made at least 3 inches from the edge of the board or from the nearest test hole or crease. This is to prevent slipping or creeping.

Bursting Strength of Container Grades of Paperboards and Built-Up Solid Fibre Containers (But Not Corrugated Containers Which Are Covered by a Separate Specification)

This specification is the same as Official Standard T 403 M-36 with the following exceptions:

Under "Calibration," the following is added:

Inasmuch as container board testing subjects the gauge to considerable shock, and inasmuch as this gauge can get out of order at any time without showing any evidence of same, it is recommended that the tester be equipped with duplicate gauges. This can be done very easily by the use of a pipe tee and a standard globe valve. The "service" gauge can be connected directly to the glycerine cylinder through the straight section of the tee. The "test" gauge should be cut off with the globe valve and only used for occasional checking of the accuracy of the "service" gauge. This checking can best be done by inserting a metal plate between the clamps and slowly turning the hand wheel through the range of the gauge avoiding straining the gauge by not carrying it all the way to the maximum reading.

Under "Procedure," the following is added:

All tests to be made on an electrically operated instrument. In testing container grades of paperboard 0.010 inch or thicker, or combined container boards the "jumbo" size tester shall be used, equipped with the reinforced rubber diaphragm regularly used on that size tester.

Thickness of Container Grades of Paperboard and Built-Up Fibreboard for Containers

This specification is the same as Official Standard T 411 M-36 with the following exceptions:

References to density and specific volume have been omitted.

Under "Apparatus" Par. 3 and Par. 4 are omitted (reference to 0.0001 graduations.)

Under report, the figure 0.0001 is changed to 0.001.

Omit paragraphs headed "Reproducibility of Results" and "Additional Information." Add the following paragraph:

THICKNESS OF LINERS OR CORRUGATION IN COMBINED CORRUGATED BOARD:

It is difficult to make this measurement within the tolerances specified above. Care must be exercised to cut the narrow strips between the flutes, which ribbons must be free of paste or silicate. The narrowness of the strip permits it to compress under the micrometer face, hence the pressure should be reduced so that it does not exceed 9 pounds per square inch. Not less than 3 strips should be cut from wide spread sections of the board, and as many determinations made on each strip as its length permits. The average of all the measurements shall be taken as the caliper thickness of the board.

Conditioning of Container Grades of Paperboard and of Solid Fibre and Corrugated Containers for Testing

To be used in place of T 402-M36.

Because of the influence of moisture absorption on the physical properties of container grades of paperboard and fiberboard containers, samples of the same being tested should be conditioned for a definite period of time under either one of two closely-controlled, standard conditions of relative humidity and temperature. All samples should be: (1) conditioned for 24 hours (48 hours for sealed cases) and tested in an atmosphere maintained at 65 per cent relative humidity at 70 degrees Farenheit temperature, which set of atmospheric conditions is standard for the Technical Association of the Pulp and Paper Industry, or (2) conditioned for 24 hours (48 hours for sealed cases) and tested in an atmosphere maintained at 40 per cent relative humidity at 70 degrees Fahrenheit temperature, which set of atmospheric conditions is standard for the National Paperboard Association. Tolerances: plus or minus one hour for board; plus or minus 3 hours for sealed cases.

The report should contain a definite statement as to which of the two standard conditions of relative humidity and temperature was used in conditioning and testing the samples. The report should also set forth the moisture contents of the samples at the time of testing as a criterion of the ability of the samples to resist moisture absorption. A plus or minus of 2 per cent relative humidity; and 5.5 degrees Fahrenheit in temperature shall be considered within the recognized tolerance.

CONDITIONING

Means shall be provided for maintaining a sufficient circulation of air to insure uniform relative humidity throughout the chamber. Each sample must be freely exposed to the circulating air of the conditioning chamber for the entire conditioning

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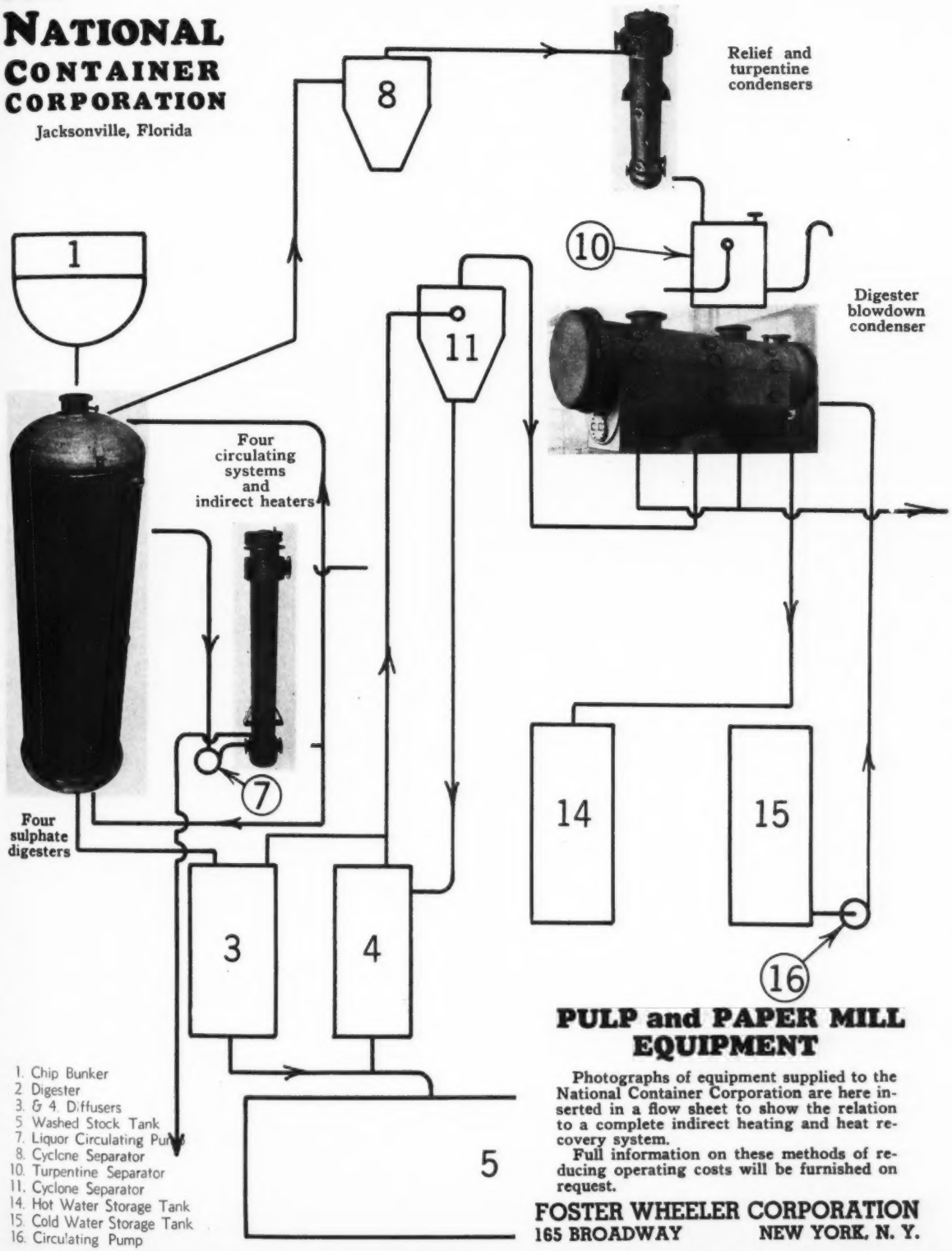

PULP and PAPER MILL EQUIPMENT

Photographs of equipment supplied to the National Container Corporation are here inserted in a flow sheet to show the relation to a complete indirect heating and heat recovery system.

Full information on these methods of reducing operating costs will be furnished on request.

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period. Because of the influence of hysteresis on accurate test results, standard practice shall be to pre-condition all samples to a moisture content less than that secured by the standard conditioning the samples for testing.

Basis Weight of Container Grades of Paperboards and Built-Up Solid Fibre and Corrugated Container Boards

This specification is the same as Official Standard T 410 M-36 with the following exceptions:

Reference to 480—sheet reams has been omitted.

The paragraph headed "Test Specimen" has been omitted.

The paragraph headed "Report" has been omitted and the following paragraph is substituted:

"Report. The results shall be expressed in terms of pounds per 1,000 sq. ft. converted to a 7 per cent moisture content based on oven dry weight; that is, the oven dry weight plus 7 per cent."

The balance of T 410 M-36 is omitted since it refers to paper and not to container grades of paperboard.

Abstracts and Bibliography Committee Report, 1937*

By Clarence J. West, Chairman[1]

The work of the Committee on Abstracts and Bibliography of TAPPI for 1937 has again been confined largely to a continuation of projects which are more or less routine and yet which demand constant attention in order that the literature and the patents of interest to the industry may be made available as promptly as possible.

Abstracts

During the calendar year 1937 there appeared 77 pages of abstracts. Comparative statistics for the last ten years are as follows:

1928	66	1933	80
1929	71	1934	151
1930	153	1935	97
1931	171	1936	136
1932	140	1937	77

As stated last year, the work of the Committee is greatly facilitated by the fact that the Chairman has access to the excellent library of The Institute of Paper Chemistry; the only periodicals of interest to the industry not accessible are those printed in the Russian language, but many of these articles are available through *Chemical Abstracts, British Chemical Abstracts,* and the abstract section of *Papier-Fabrikant.*

Bibliography

The Bibliography of Paper Making, 1936, was issued by the Technical Association as a cloth bound volume of 285 pages. In order that the patent list might be complete, patents for 1935 and 1936 were included in this volume. An innovation introduced last year was the binding of the bibliography in cloth, partly because of the size of the volume and partly because it is unlikely that future collective bibliographies will be issued. While this is to be regretted, it is understood that the cost of such collective volumes is almost prohibitive, in view of sales.

The bibliography and patents for 1937 have been assembled and are now in the hands of the printers.

Patents

Quarterly lists of United States Patents have appeared in the PAPER TRADE JOURNAL for January 21 April 29, July 15, and October 14, 1937. As mentioned above, the complete list of patents for 1937 will be included in the annual bibliography for that year.

The quarterly lists are prepared by an examination of the weekly issues of the Official Gazette of the U. S. Patent Office. In compiling the annual list advantage is taken of the monthly lists issued by the Mead Corporation Library and the lists published in *Paper Industry,* as well as the abstracts published in *Chemical Abstracts* and in the Technical Section of the PAPER TRADE JOURNAL.

The quarterly lists are arranged numerically, while the annual list is classified according to the Patent Office scheme, which brings patents of the same nature together.

Indexes

Indexes for the two volumes of the PAPER TRADE JOURNAL, 104 and 105, appearing in 1937, have been prepared and published.

Current Research

Through the cooperation of the research workers in university and governmental laboratories, a revision of the current research in the field of pulp and paper was prepared and was published in PAPER TRADE JOURNAL for June 17 and 24, 1937. Revisions of this list will be made at two-year intervals.

Waste Gases and Liquors

During the past twelve years, three compilations of the patents on waste gases and liquors of the pulp industry have been published in the PAPER TRADE JOURNAL. Because of the interest in this field, it is felt that such lists should be published every two years. Therefore, it is hoped that such a list, covering the period 1935 to 1937, may be published early in 1938.

Acknowledgement

The Chairman wishes to express his deep appreciation of the work of his associates, A. Papineau-Couture and John F. Ohlson, who are responsible for the preparation of most of the abstracts. The Committee is also indebted to The Institute of Paper Chemistry, which has made available a certain amount of the time of the Chairman for work on the annual bibliography.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Institute of Paper Chemistry, Appleton, Wis.

Review Of The Paper Industry Literature

Abstracts Compiled By the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson and Clarence J. West, Chairman of the Committee.

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Adhesives

Develop New Equipment for Research Control Work on Starch Adhesives. Shears 55, no. 532:57-58 (April, 1937); Bull. Inst. Paper Chem. 7:325.—Several new pieces of research equipment are described which have been developed particularly for control work on starch adhesives for making corrugated board in the Chicago laboratory of the Stein Hall Mfg. Co. They include an apparatus for checking the viscosity characteristics, gelantinization temperature, and rate and degree of viscosity development of the adhesive at the moment of gelantinization, and a laboratory double backer for checking different types of adhesives.—C.J.W.

Water-Soluble Adhesives Without Cereal Flour. Karl Miksch. Chem.-Ztg. 61, No. 36:373-375; No. 38:396-397 (May 5, 12, 1937); Bull. Inst. Paper Chem. 7:366.—The article discusses suitable adhesives as substitutes for those prepared with cereal flour, such as plant adhesives in the form of dry powders prepared from potato starch, cellulose adhesives, and sulphite waste liquor. Poor results obtained with the latter when pasting linoleum to the floor can be overcome by using neutralized liquor, without traces of beginning fermentation, by applying it in the correct consistency, that is in a neither too thick nor too thin application, and by selecting appropriate floors. Plain wooden floors are best, whereas lacquered and very porous floors should be avoided.—C.J.W.

Development of Adhesives. L. E. Leverone. Paper Converter Envelope Ind. 11, No. 7:6, 8 (July, 1937); Bull. Inst. Paper Chem. 7:405. The use of new materials and high speed machinery necessitated the development of new adhesives. The requirements of modern packaging or gluing equipment vary so widely that no such thing as a "best adhesive" exists. Each product is designed to do a special task and users of adhesives are advised to refer their special problems to a reliable adhesive manufacturer and let him make a survey.—C.J.W.

What May We Expect of Starch. R. M. Cobb. Donald V. Lowe, Emil Pohl and W. Weiss. Tech. Assoc. Papers 20: 299-302 (June, 1937); Paper Trade 105, No. 8: 33-36 (Aug. 12, 1937).—As adhesive, more starch is required for a given purpose than of lighter adhesives such as casein. In a given time, at a given contact angle, starch will penetrate a sheet inversely as the square root of the viscosity of the solution. Starch slows down sheet formation, reduces the per cent solids present in the sheet after wet pressing, but increases in most cases the per cent solids present in the dried sheet. Use of excessive amounts of starch causes crushing. If starch is not too degraded, the per cent required to give maximum strength to the sheet is about 0.5 per cent.—A.P.-C.

Use of Soya-Bean Meal for Adhesive Purposes. A. Bowden. Oil and Soap 114 (1937).—Soya-bean meal mixed with animal glue or casein finds use as a sizing medium in the paper industry. Alpha-protein (soya-bean meal treated with 0.2 per cent sodium hydroxide and coagulated with 0.5 per cent sulphuric acid) is a stronger adhesive than gamma-protein (untreated soya-bean meal), although it is not as strong as casein.—A.P.-C.

Alkaline Processes

The Effect of Sodium Chloride in Sulphate Cooking. Finnish Paper and Timber J. 19, No. 7A:328-330, 332-333 (April, 1937); Bull. Inst. Paper Chem. 7:366.—The effect of sodium chloride in sulphate cooking depends largely on the kind of wood used; it is much more pronounced when the dense pine from northern Finland is employed with an extract of almost 6 per cent, than in the case of quick grown pine from southern Finland with a low yield of extract (3 per cent). Pulp yield, lignin, ash, and Tingle number are higher with northern pine; strength values, however, are lower. This is partly due to sodium resinate being precipitated upon the fibers and hindering the cooking process. The stock is slightly harder and weaker. This weakening tendency increases with additions of sodium chloride up to 15 per cent, after which it remains the same.—C.J.W.

Production of Paper Pulp from Fibrous Materials. Champagne Paper Corp. Brit. pat. 460,812 (Jan. 6, 1936).—Decorticated flax or hemp is crushed in presence of water (e.g., in a rod mill) and digested at about 50 lb. per sq. in with 5 to 15 per cent of a 95.5 aqueous mixture of sodium hydroxide and sodium sulphite. The pulp is then chlorinated, washed with dilute aqueous alkali, and bleached with sodium hypochlorite.—A.P.-C.

Alkaline Pulping Process. Fredrick Olsen assignor to Cellulose Research Corp. Can. pat. 364,478 (March 2, 1937).—Wood chips or more finely divided wood, is submerged in a boiling solution of alkaline-earth hydroxide for 1 hr., the temperature is raised to 125 deg. C. and maintained for a sufficient time to soften the wood throughout its entire mass with the alkalinity of the treating solution maintained. The noncellulosic constituents remain in the mass so that the product exceeds 90 per cent of the dry weight of the original wood.

Manufacture of Cellulose. H. Dreyfus. Brit. pat. 459,790 (July 11, 1935).—Lignocellulosic material is treated uninterruptedly with a 2.5 to 10 per cent aqueous caustic soda solution at a temperature rising continuously or in stages (5 deg. C. per hr.), from 120 deg-145 deg. to 155 deg-180 deg. C.—A.P.-C.

Preparation of Cellulosic Material. Martin J. Connolly. U. S. pat. 2,080,533 (May 18, 1937).—Material such as hemp hurds is subjected to mild intermittent cooking treating with intermediate wash-

ings. e.g., The material is soaked in an open container in a 1 per cent caustic soda solution, washed, cooked for 3 to 7 hrs., at about 130 deg. C. under a pressure of 25 pounds or over in a 0.1 per cent to 1.0 per cent caustic soda solution, washed, subjected to a mild bleaching treatment, washed, and treated cold with a 17 per cent caustic soda solution, to obtain a high alpha-cellulose pulp. (Cl. 92-13).—A.P.-C.

Pomilio Process By Gas Chlorination. Umberto Pomilio. Ind. Eng. Chem., News Ed. 15: 73-74 (1937).—A description of the production of bleached wheat straw pulp, prepared by the Pomilio chlorine-gas process at the new mill at Foggia, Italy.—A.P.-C.

Process for the Manufacture of Cellulose. H. A. Knopf. Belg. pat. 419,147 (Jan. 31, 1937).—Saturation of the cooking liquor with lime is maintained by adding fresh quantities of lime corresponding to the amount consumed.—A.P.-C.

Concentration and Filtration in the Pulp and Paper Industry. R. J. Venn. Paper Maker 94; TS122-128 (Aug. 1937).—A description of the construction and operation of the rotary vacuum filter and of its various applications in pulp and paper making.—A.P.-C.

Some Factors in Soda Losses in Alkaline Pulping. G. A. Day. Paper Mill 60, No. 26: 82, 84, 87, 99 (June 26, 1937); Paper Trade J. 105, No. 1: 108-110 (July 1, 1937).—A discussion of soda losses in pulp washing, sludge washing, lime reburning, furnace losses, and in cleaning tanks, evaporators, etc.—A.P.-C.

Production of Noncellulosic Organic Material from Black Liquor. Mead Corp. assignees of H. J. Reboulet. Brit. pat. 460,885 (May 2, 1935).—Carbon dioxide is bubbled through the black liquor (without previous concentration) until the pH reaches 8 to 9. The liquor is then heated to 50 deg. to 70 deg. C. and precipitated organic material is filtered off, neutralized with dilute aqueous sulphuric acid, washed, and dried.—A.P.-C.

Continuous Causticizing System at Crossett Paper Mills. F. J. Lammers. Paper Trade J. 104, No. 22: 39-42 (June 3, 1937).—A description of the plant, which is featured by Infilco causticizing equipment and a vertical Nichols-Herreshoff lime calcining furnace, emphasizing the advantages of the system.—A.P.-C.

Pulp Waste Liquor Recovery. Albert E. Nielsen. Fr. pat. 809,165.—The waste liquor is evaporated and sufficient active chemical added to permit its being re-used as cooking liquor. After repeated use in this manner, the total solids contents builds up to such a point that a portion is withdrawn from the cycle and its constituents can be recovered economically, as by calcination.—A.P.-C.

The Treatment of Paper Mill or Similar Wastes. J. Grant. Paper Maker. 94: TS116-121 (Aug. 1937).—A description of the investigations carried out on the treatment of effluent from an esparto and rag mill. The process finally adopted is essentially as follows: washings from digested esparto and digested rags, sludge from bleach liquor preparation and washings from bleachings of rag, wood and (or) esparto are mixed, ferrous sulphate is added and the mixture is aerated, general waste material (including machine house and floorwashings, etc.) is added and the mixture is passed through a continuous Dorr classifier; the sludge is put through a rotary vacuum filter to separate the solids which are sent to a dump while the effluent is returned to the system ahead of the ferrous sulphate addition; the overflow from the classifier passes through a settling pond before being discharged into a stream. In regular operation the system gives an effluent with 2.6 to 6.6 pasts suspended solids per 100,000, and a biochemical oxygen demand of 0.30 to 1.99 parts per 100,000. The equipment used is described in detail. The method is quite flexible and can be adapted to a variety of operating conditions in the mill.—A.P.-C.

Treatment of Paper Mill and Similar Wastes. J. Dickinson and Co., Ltd., J. Grant, Dorr-Oliver Co., Ltd., R. F. Stewart and P. Evans. Brit. pat 463,458 (Dec. 18, 1935).—Effluents with a high oxygen demand (esparto washings) mixed with effluents containing oxidizing agents are agitated first with an alkali (e.g., a portion of the sludge from the causticizing section of the esparto plant), and then with a metal salt forming a flocculent precipitate (e.g., ferrous sulphate). The effluents are clarified, and the sludge is mixed with the remainder of the caustic sludge and filtered, the filtrate being returned to the incoming untreated effluents.—A.P.-C.

Treatment of Paper Mill Effluents. Ind. Chemist 13, no. 148:181-185 (May, 1937); Bull. Inst. Paper Chem. 7:399.—An illustrated description is given of the effluent disposal plant of the Croxley Mills in England which came into operation in the spring of 1935. Many grades of high quality papers from esparto, rags, bleached and unbleached pulp are made in this mill, resulting in effluents with widely varying characteristics. Thus, the washings from digested rags and esparto give rise to an effluent with a high oxygen demand, while the bleaching operations produce an effluent which is of an oxidizing character. Finally, there are the washings and other waste from the machine house containing a considerable quantity of suspended solids. The new plant consists essentially of three agitating tanks, two clarifier tanks, a rotary filter, and the connecting conducts, pumps, and distribution boxes. It is based on the consideration that instead of treating the final effluent as a whole, it should be divided into sections and one effluent be employed to oxidize the other. The addition of ferrous sulphate was found to improve flocculation considerably. A flow sheet is included and presented in such a manner that many possible variations in the treatment can readily be arranged, thus increasing the flexibility of the system. It is applicable not only to esparto mills but to all paper mill and similar wastes. A patent has been applied for in conjunction with Dorr Oliver Co. Ltd. —C.J.W.

Process for the Continuous Manufacture of Liquid Rosin from the Raw Soap Obtained As a By-Product in the Manufacture of Sulphate Pulp. H. Bergstrom and K. Cederquist, Stockholm, Swed. pat. 87,842 (Sept. 8, 1932). The raw soap is mixed with acids or acid salts in an apparatus furnished with agitators, and the whole process so arranged that complete decomposition takes place. —J.F.O.

The Manufacture of Sulphate Pulp. A. Zennstrom. Papier-Fabr.. 35, no. 30, 131: 303-04 (July 27, 1937).—Generalities concerning the manufacture of sulphate pulp. The cooking liquor usually contains 160 to 170 grams per liter of total alkali and 135 to 140 grams per liter of active alkali.

200 to 250 kilograms of active alkali is necessary to cook 1000 kilograms of spruce or pine wood. Causticizing and the preparation of the cooking liquor is also discussed.—J.F.O.

Control in the Cooking of Straw Pulp. S. Obosny. Zellstoff u. Papier 17, No. 8: 355 (August, 1937).—The author describes a method for the control of cooking straw by testing the liquor for its lignin content. The lignin content increases during the cooking to a maximum and then decreases at the end of the cook. The method requires about 25 minutes, consists of determination of the specific gravity, precipitation of the lignin with normal hydrochloric acid. Calculations for a sample determination are given.—J.F.O.

Half, Whole and Refined Straw Pulp, and Paper, Cartons, Board and Fiber Plates Made Therefrom. Willi Schacht. Wochbl. Papier-Fabr. 68, Special Number : 35-42 (July 2, 1937).—The present status of the use of straw pulp is discussed; the common straws, such as wheat, oats, etc., are best used for agricultural purposes, but beet sugar, fodder, rape and poppy straws can be used. The average fiber length of wheat and rye is 1.33 mm., of beet sugar straw 1.27 mm., fodder 1.51, rape 2.08 and poppy straw 2.28 mm. The manufacturing conditions are related, from the improved cutters for the straw to methods for the recovery of the chemicals. Various cooking methods, including Pomilio are briefly described.—J.F.O.

Process for the Manufacture of Pulp from Straw or Other Pecto-Cellulose Plants. G. H. Dupont and J. F. X. de Fayard. Ger. pat. 643,730 (Oct. 16, 1934).—Straw or other pecto-cellulose plants are cooked in black liquor rich in sodium lignates which contain no free alkali or only a small amount, thus the same liquor is used to cook two classes of pulp. —J.F.O.

The Present Status of the Pomilio Process for the Manufacture of Pulp. P. Waentig. Zellstoff u. Papier 17, no. 8: 352-54; no. 9: 392-94 (Aug., Sept., 1937).—The Pomilio process makes the most progress in those countries where the usual woods used for pulp manufacture are unavailable and where there is an abundance of straw of various kinds which will react under the action of chlorine. The basis of the Pomilio process is the Cross and Bevan method for the determination of cellulose. The process consists of alkaline pre-treatment at high temperatures, chlorination with gaseous chlorine and then after-treatment with alkali at usual temperatures. Details of the process and complete description of the operation of a mill in South America is given. 15 kilograms of caustic soda and 25 kilograms of chlorine is necessary to produce 100 kilograms of 88 per cent unbleached wheat straw pulp with an average yield of 45 per cent. A list of the mills finished and under construction shows the wide diversity of raw materials and location throughout the world.—J.F.O.

Evaporation of Black Liquor. Torsten Samson. Svensk Pappers-Tidn. 40, no. 15:361-363 (Aug. 15, 1937); B.I.P.C. 8:56.—With reference to an article by T. Molin on this subject (Svensk Pappers- Tidn. 39: 403-412 (Nov. 30, 1936), the author discussed certain points from a different angle. The evaporation per hour in an evaporator tube depends upon the difference between the steam temperature outside the tube and the mean liquor temperature inside the tube (net temperature difference). The gross temperature difference is the difference between the steam temperature outside the tubes and the saturation temperature of the steam leaving the separator. If the liquor is assumed to boil all along the tube, the gross temperature difference is composed of three factors: *a*) the net temperature difference, *b*) the difference between the mean boiling point of the liquor in the tube and the boiling point of water at the same pressure, and *c*) the temperature loss caused by the pressure loss between the evaporator tubes and the separator. Black liquor has boiling points which influence the evaporation to an appreciable extent; the mean temperature of the liquor in the tubes is a function of the amount of liquor circulation. Since black liquor foams strongly, a great speed of steam is chosen at the entrance of the separator. This causes a marked pressure loss for the small available net temperature difference. The evaporation capacity of an evaporator must not be judged entirely from the heating surface; evaporators should be so designed that a desired output at the available gross temperature difference is reached with the smallest possible tube surface.—C.J.W.

Process and Device for the Evaporation of Pulp Waste Liquors. B. N. Segerfelt, Tolmezzo. Swed. pat. 88,209 (March 31, 1934). The evaporator is filled with balls.—J.F.O.

Revolving Tube Oven. Metallgesellschaft A.G., Frankfurt a.M. Ger. pat. 606,168 (July 7, 1931). —Means for regulating the introduction of air into the combustion chamber.—J.F.O.

Analysis and Testing

The Choice of a Microscope. James Strachan. Paper Maker. 93: TS49-50 (April, 1937).—A brief discussion of the choice of a microscope for the paper mill laboratory.—A.P.-C.

Applications and Control of rH in the Paper Industry. Maurice Déribéré. Papeterie 59; 717-723 (Aug. 10, 1937).—An explanation of the meaning of the oxido-reduction potential, or rH, and of its determination, together with indications of its uses in the paper industry.—A.P.-C.

Standard Methods and Water Standards. Harry E. Jordan. Tech. Assoc. Papers 20: 302-304 (June, 1937); Paper Trade J. 105, No. 7: 36-38 (Aug. 12, 1937).—A discussion and explanation of the work on water standards and on standard methods of water analysis being carried out by the American Public Health Association and the American Water Works Association, in co-operation with other interested organizations.—A. P.-C.

Pulp and Paper Industrial Water Specifications. H. C. Schwalbe. Tech. Assoc. Papers 20: 362-364 (June, 1937); Paper Trade J. 105, No. 7: 41-43 (Aug. 12, 1937).—A review of water requirements for pulp and paper making (exclusive of boiler water), illustrating the necessity for the collection of more reliable data.—A. P.-C.

Simplified Volumetric Determination of Alpha, Beta and Gamma Cellulose in Pulps and Papers. Herbert F. Launer. J. Research Nat. Bur. Standards 18, No. 2:227-234 (Feb., 1937); Paper Trade J. 104, No. 21: 37-41 (May 27, 1937).—A detailed description and discussion is given of a potassium dichromate volumetric method for the determination of an alpha, beta and gamma cellulose, which is rapid, requires no precision weighings, involves no ash nor moisture determinations, and gives results

that are in good agreement with and as reproducible as those obtained gravimetrically.—A.P.-C.

The Determination of Celluloses. M. Brot and A. Albarranc. Rev. Shim. Ind. (Paris) 46: 200-205 (July, 1937).—Dean and Tower's modification (J. Am. Chem. Soc., 1907, 119) of Cross and Bevan's method was compared with Kurschner and Hoffer's alcohol-nitric acid method (Tech. u. Chem. Papier u. Zellstoff Fabr. 26, 125-139 (1929)) on birch wood sawdust passing a 75- and held on a 110-mesh sieve; two series of tests were carried out by the latter method using nitric acid of density 1.52 and 1.39, respectively. *Conclusions*: Both methods require about the same time (3 hrs. exclusive of drying). On prolonging treatment beyond 3 hrs., attack continues quite notably by the nitric acid method, but is practically negligible by the Cross and Bevan method. With nitric acid of 1.52 density, five one-hour treatments are required, as compared with 3 treatments with acid of 1.39 density, and the residue in the latter case is about 3 per cent lower, probably due to a slight nitration of the cellulose. The residues obtained by all three methods contained considerable proportions of pentosans.—A.P.-C.

Methods of Determining Cellulose in Bast Plants: Comparison of Cross and Bevan's and of Kiesel and Semiganovsky's Methods. F. Kalmanovich and A. F. Kolotireva. Rayon Textile Monthly 17: 391-393, 462-464, 529-530 (1936).—A series of analytical experiments were made on Kendir bast to compare the Cross and Bevan with the Kiesel and Semiganovsky method (treatment with hydrochloric acid, solution in sulphuric acid, determination of glucose). The latter without preliminary treatment gives an increase yield of cellulose, but this is due to the cellulose of the cover tissues, which has no practical value. The Kiesel and Semiganovsky method following a preliminary treatment with a solution containing 1 per cent of sodium hydroxide and 1 per cent silicate avoids this increased yield. This modified method is considered superior to the Cross and Bevan method. When the latter is used, the cellulose obtained is not pure, and slight changes in procedure can affect the results appreciably. The method recommended has the advantages of great simplicity, accuracy and the possibility of running a large number of determinations. The preliminary extraction with alkali was chosen in preference to extractions with alcohol plus benzene, water, water plus ammonium oxalate and water plus sodium hydroxide without silicate.—A.P.-C.

The Laboratory Fractionation of Cellulosic Materials. T. T. Potts and F. Bridges. Paper Maker 93: TS79-80, 91-94 (May, June, 1937).—A description is given of an attempt to effect a systematic and complete fractionation of paper making cellulosic materials (flax straw shive and esparto grass) into the following fractions: soluble in ether (esparto only), alcohol, water, calcium pectate fraction, lignin fractions (2), hemicellulose fractions (2), chlorolignin fractions (2), and residual cellulose fractions. The results are discussed to show their significance, but no general conclusions are drawn. —A.P.-C.

Pebble-Mill Beating Under Vacuum and Pressure. Frederick D. Bates, Jr. Paper Trade J. 105, No. 2: 36-37 (July 8, 1937).—As far as can be told from laboratory pebble-mill tests, no different effect of significant magnitude is obtained by beating under a vacuum, or at 15 to 60 lb. pressure, compared to that obtained by beating at atmosphere pressure.—A.P.-C.

Pulp-Sampling Tool. Arthur B. Andrews. U.S. pat. 2,083,418 (June 8, 1937).—A power-driven pulp sampler consists essentially of a shank adapted to be rotated about an axis of rotation, a combination guide and retainer member coaxial with the shank, and a cutter blade fixed to the shank in such position as to describe a path having the combination guide and retainer as center. The outer surface of the blade is cylindrical and the inner surface is a conical section, the base of the cone meeting the cylindrical surface at the point end of the blade and thus determining the thickness or taper of the blade. The blade is held in the tool in such a manner that all torques or stresses occurring during the passage of the cutting edge through the baled pulp will be absorbed by a dovetailed seat. (Cl. 83-15).—A.P.-C.

Method and Apparatus for Determining the Consistency of Pulp Solutions. Otto Maass. U. S. pat. 2,083,074 (June 8, 1937).—A pair of electric cells are immersed in the same pulp suspension. The electrodes of one cell are protected by a screen to exclude pulp constituents from the space between these electrodes while permitting the liquid component of the suspension to have free access to such space. The electrodes of the other cell are left unprotected. The two cells are balanced against each other or otherwise included in a suitable electric network so that the ratio of the resistance between the electrodes of the protected cell to that between those of the unprotected cell may be readily determined as a measure of the consistency of the suspension. (Cl. 175-183). —A.P.-C.

The Application of Micro-Analysis to Identification of Specks in Pulp and Paper. B. L. Browning. Tech. Assoc. Papers 20: 311-312 (June, 1937); Paper Trade J. 105, No. 10: 38-39 (Sept. 2, 1937). —A brief description of the use of micro-chemical separations and determinations for the analysis of paper specks.—A.P.-C.

Useful Fiber Stain for the Paper Chemist. W. H. Boast. Chemist-Analyst 26: 30-31 (1937).—To distinguish different kinds of wood in soft white shavings to be used in the top-liner finish of white, patent-coated boards, a stain consisting of the following 3 solutions is recommended: (A) decinormal ferric chloride, (B) decinormal potassium ferryicyanide, (C) dissolve 100 g. of calcium nitrate in 50 cc. of water, add 3 cc. of 9 per cent potassium iodide solution and 1 g. of iodine, and let stand for 1 week before using. Defiberize the sample of shavings and transfer the fibers to a microscope slide. Mix 10 cc. of solution with an equal volume of solution B in a small beaker and place the dried fibers in the stain for 3 min. at 20 deg. C. Wash the slide by dipping in distilled water 3 times, dry by evaporation and place 3 drops of solution C on the fibers. After 1 min. cover with a cover glass and examine. The following colors are obtained: bleached sulphite, pink; unbleached sulphite, blue; bleached decidous soda fibers, violet; groundwood, greenish yellow; rag fibers, wine red.—A.P.-C.

Unbleached Chemical Pulp: Testing Methods for Determining Degree of Cooking. David Johansson. World's Paper Trade Rev. 108: TS59-60 (July 16, 1937).—A brief review of the methods in general use.—A.P.-C.

The Hardness of Unbleached Pulps. Papier 40: 481-484 (June, 1937.—A brief description of the principal methods used for determining the hardness of unbleached pulps and of the equivalence between them.—A.P.-C.

The Freeness Tester in the Manufacture of Boxboard and Test Liners. Frederic G. Barber. Paper Industry 19: 545-547 (Aug., 1937).—A discussion of the application of the instrument for controlling the manufacture of test liners and boxboards. —A.P.-C.

Automatic Freeness-Drainage Control. R. D. Kehoe. Tech. Assoc. Papers 20: 219-224 (June, 1937); Paper Trade J. 105, No. 5:36-41 (July 29, 1937).—A description of freeness and consistency devices that aid in controlling uniformity of stock delivered to the paper machine, more particularly the Quinn continuous freeness tester, the Schur consistency control and the Lewellen control.—A.P.-C.

Standard Method for the Determination of the Srength of Pulps. Committee for the Strength Testing of Pulps. Papier-Fabr. 35, No. 14:109-111; No. 15: 121-24; No. 16: 129-31 (April 2-16, 1937). Discussion of the problems encountered by the strength testing of pulps committee from its inception in 1927 to the present date especially the various methods and apparatus being already in use. All phases of the testing are described in detail from the preparation of the pulp sample to the division of the finished sheet for the various tests. The apparatus for each test or treatment are described, the Jokro mill is used for beating up the pulp.—J.F.O.

Progress in the Testing of Paper and Pulp During the Year 1936. Korn. Report from the State Bureau of Testing Materials Berlin Dahlem. Zellstoff u. Papier 17, No. 6:233-37 (June, 1937).—Wochbl Papier 68. No. 21: 395-97; No. 22: 412-13. (May 22, 29, 1937). Through the aid of references from trade journals in the world's pulp and paper producing countries, the author briefly discusses, among other subjects, the following: microscopical investigation of rosin sizing, testing the pH of paper and pH as an aid in the bleaching process, the importance of the time factor in tensile and Mullen tests, influence of filler on strength properties, smoothness and other paper tests, various chemical tests on pulp, the kollergang as a testing apparatus, and tests for beating.—J.F.O.

Some Expedients to be Used with Sandberg-Bergman's Sheet Making Apparatus. Erik Sunesson. Svensk Pappers-Tidn. 40, no. 9-219-220 (May 15, 1937.)—The author suggests modifications in the arrangement of the stirrer, a lesser volume of liquid for pulps of higher beating degree, and an arrangement with bellows underneath the screen from which the sample sheet is couched off, greatly facilitating the removal of the wet sheet.—C.J.W.

Moisture Content of Groundwood Pulp. H. Postl. Pappr- u. Holzstoff-Ztg. 44, no. 18:199 (April 30, 1937).—Groundwood pulp is shipped in different forms, just thickened (70 per cent moisture) in bags or rolls for short distances; this pulp is readily defibered; the method of transportation, however, is too expensive for long shipments. In the latter case the pulp is shipped in well pressed and dried laps or rolls. The method of sample taking and drying for determining the correct moisture content of such pulp is described. The percentage of moisture is subtracted from the original weight of the bales, the weight of the wood thus obtained is multiplied with 100 and divided by 88 in England and Germany; the resulting figure indicates the percentage of actual groundwood pulp for which payment is made.—C.J.W.

Development of the Strength Testing of Pulp. G. Jayme. Papier-Ztg. 62, no. 29:506-508; no. 30-5:21-522 (April 10, 14, 1937).—The author reviews briefly the development of strength testing in England, the United States, Canada, Sweden, Finland, and Germany, the organizations which control the studies, the instruments used, their agreement and differences, and the possibilities for arriving at an international method.—C.J.W.

Testing Methods for Chemical and Mechanical Pulp. David Johansson. Svensk Pappers-Tidn. 40, no. 9:210-218 (May 15, 1937).—The most important physical and chemical testing methods for evaluating pulp quality (chemical and mechanical) are discussed, Reference is made to the English and German standard methods of strength testing. A committee hase been working since 1933 to investigate the possibility of a uniform strength test for the Scandinavian countries. A comparison between the values of the Thwing-Elmendorf, Marx-Elmendorf, and Brecht-Imset instruments for determining the tear-through strength of papers has been carried out at Östrand. For beaten papers, the instruments are of equal value, for unbeaten samples the Thwing-Elmendorf values are considerably higher. The Brecht-Imset apparatus permits accurate testing with a single paper sheet. Whiteness values obtained with the General Electric reflection meter and Stephansen's apparatus (P.F.I. units) were compared. Amongst the chemical testing methods special mention is made of the determinations of viscosity (TAPPI) and the degree of polymerization according to af Ekenstam. A comparison was made between the values of the Schopper Riegler instrument (S.R. deg.), Green's freeness tester, the British sheet making apparatus, and Gartshore's wetness tester for evaluating the beating degree of mechanical pulp. For high S.R. values, the best differentiation was obtained with the wetness tester and the british sheet machine. The freeness tester was useless at value higher than 80° S.R. The quality of groundwood pulp is characteristized by beating degree, strength of the sheet prepared from such pulp, and also by fiber fractionation. Special instruments and laboratory sieves are used for this purpose.—C.J.W.

Simple Testing Methods. H. Postl. Zentr. Papierind. 55, no. 11: 55 126-127 (June 1, 1937). —A list of very simple testing methods, which can be carried out without the use of instruments, is given.—C.J.W.

Microphotography as Aid in the Investigation of Photographic Papers. Z. wiss. Mikroskopie 54, no. 2:145-158 (July, 1937); Bull. Inst. Paper Chem. 8:33.—A brief description is given of the many possible applications of photomicrography to the study of photographic papers. Several illustrations are included showing the fiber mixtures of the base paper, transverse sections of the coated paper indicating base paper, baryta layer, and emulsion in one or several layers, grain sizes of developed and undeveloped emulsions, etc.—C.J.W.

Luster Determination with a Photoelectric Photometer. Henry Ransom and Sidney M. Edelstein. Am. Dyestuff Reptr. 26, no. 15:P432-437

(July 26, 1937); Bull. Inst. Paper Chem. 835.—A photoelectric photometer is described which measures the relative intensities of the light reflected at an angle of 45 deg. with a sample surface as the angle of incidence of the light is varied. The photometer employs two blocking layer photocells in a balanced arrangement. Luster number, as measured with the instrument, is defined as the ratio of light reflected when the sample is illuminated at 45 deg. to that when illuminated at 90 deg. The rankings of a number of undyed yarns by luster number and by visual examination were identical. The ranking of undyed fabrics and of dyed yarns by luster number was unsatisfactory as compared to visual ranking.—CJ.W. —

Paper as Carrier of Print. M. Hartmann. Papier-Ztg. 62, no. 29: 506 (April 10, 1937).—Supplementing the article previously published under this title the author points out the suitability of Lange's photo-electric reflection meter for measuring the brightness of paper in place of the expensive Zeiss-Pulfrich step-photometer, which smaller laboratories cannot afford. Measurement carried out with both instruments showed the same order of values, the step-photometer data being in general somewhat lower. Paper samples printed in different colors measured with both instruments, the results showing again good agreement. The Lange instrument is also suitable for measuring the brightness or reflection value of other products.—C. J. W.

Physical Definition of Subjective Brightness. A Kuehl. Z. tech. Physik 17, no. 11:439-441 (Nov., 1936); Sci. Abstracts 40 A:61 (1937).—The author, from known data on threshold brightness and effect of glaring brightness, derives equations which purport to express numerically the subjective brightness of a surface of known area and known physical brightness when the area is surrounded by an extended field of known physical brightness. Another equation gives its numerical position in the black white scale. The equation applies to uncolored fields. —C.J.W.

Simplified Determination of Resin in Papers and Pulps. Herbert F. Launer. J. Research Nat. Kuehl.Bur. Standards 18:227-234 (1937); Paper Trade J. 105, No. 2: 33-36 (July 8, 1937).—The method is applicable to papers which have or have not been surface-sized with glue or starch or coated with casein-clay emulsion. It consists essentially in extracting 5 to 7 g. of paper or pulp with 95 per cent ethanol containing 4 cc. per l of concentrated hydrochloric acid, extraction being carried out in a Soxhlet at the rate of 15 siphonings per hr. for 2 hrs. (for uncoated and non-surface-size papers and pulps) to 2.5 hrs. (when glue, starch or casein is present), evaporating the alcohol on the water bath, drying for 15 min. in the oven at 100 deg. C., taking up the residue in anhydrous ether, drying 15 min. at 100 deg. and weighing. The equivalent weight of the extracted resin, based on the oxidation by dichromate, is made the basis of a new criterion of the purity of the extract. The official TAPPI method is shown to give incomplete extraction and an extract that is contaminated with non-rosin impurities. The present method gives results in good agreement with that of Sutermeister and Torrey (Paper Trade J. 94, No. 3, 33 (Jan. 21, 1932)), but is much simpler and quicker.—A.P.-C.

Development of Paper Testing in Great Britain Since 1930. L. G. Cottrall. World's Paper Trade Rev. 107: TS26-27 (May 21, 1937).—A brief review with bibliography of 21 references.—A.P.-C.

Metal Particles in Paper. P. Goldsmid. Papier 40: 315-320 (April, 1937).—A brief discussion of the causes, effects and disadvantages of the presence of metal particles (more particularly iron) in paper, with a description of the detection and quantitative determination of iron in paper.—A.P.-C.

Alkali-Staining Property of Paper. Anon. Paper Trade J. 104, No. 19: 50 (May 13, 1937).—A method is described in detail for determining quantitatively the resistance of paper to staining by alkali.—A.P.-C.

Evaluating the Printing Qualifications of Paper. M. S. Kantrowitz and R. H. Simmons. Paper Trade J. 105, No. 1: 97-102 (July 1, 1937)—A description and discussion of the tests used for evaluating the printing qualities of paper and of their value and significance.—A.P.-C.

Sizing Tests on Writing Paper. James Strachan. Paper Maker 93: TS17-18 (Feb. 1937).—Recent methods of determining the resistance of paper to writing ink are briefly reviewed.—A.P.-C.

Correlation of Distillation Range with Penetration of Creosote into Paper Strips. C. J. Frosch. Physics 7: 167-178 (1937).—Measurements of the penetration tension are recorded; they conform to two equations of which the more empirical one is more convenient for application to practical problems. The contact angles for creosote-paper are extremely small or zero. Possible errors in the paper-strip method are considered; it is important to calibrate each strip with a reference liquid. Washburn's equation fails in its neglect of the hydrostatic head effects. Absorbed water does not affect the penetration of the series of creosotes examined.—A.P.-C.

Manometer Set-Ups for Liquid Level Indication. F. B. Shannon. Paper Industry 19: 564-565 (Aug., 1937).—A brief description of the various set-ups encountered in the use of the manometer as a liquid level indicator.—A.P.-C.

Factors in the Mullen Tester Influencing the Bursting Strength of Paper. T. Yamaguchi. J. Cellulose Inst. Tokyo 13: 148-153 (1937).—A study of the effect of bulge height and rubber-diaphragm strength on bursting strength, and of the relation between tensile strength, elongation and bursting strength.—A. P.-C.

Studies upon Smoothness, Porosity and Printability of Paper with New Methods for Determination. Frank M. Williams. Tech. Assoc. Papers 20, 305-309 (June, 1937); Paper Trade J. 105, No. 8: 43-47 (Aug. 19, 1937)—Barometric pressure, temperature and humidity conditions are important functions of all smoothness testers of the air flow type. Standard permanent test plates should be available for checking any smoothness testing instrument. In tests made upon samples under annular compression area, the largest practical outside and inside diameters for a given annular area are desirable, and when specifying a given compression area, both the inside and outside diameters of the limiting circles should be given. Readings of the Williams and of the Bekk smoothness testers can be correlated when taken under carefully controlled conditions. Smoothness and plane porosity tests give valuable information as to the printability of paper. —A.P.-C.

Experiments in the Photo-Electric Measuring of Opacity and Brightness. T. H. Farebrother.

Paper Maker 94: TS104-112 (July, 1937); World's Paper Trade J. 107: TS38-42; 108: TS52-58 (June 18, July 16, 1937).—A brief discussion of 10 different instruments (3 of the visual class, 7 of the photo-electric class) for measuring the opacity and brightness of paper, particular reference being made to accuracy of repetition with the same and different observers when measuring contrast ratio with the Bausch and Lomb opacimeter. The concept of "specific opacity" is developed as a means of measuring opacity at, or correcting it to, a specified weight and for fixed relative humidity conditions. —A.P.-C.

Quantitative Test for Soap Wrap Paper. T. Linsey Crossley. Tech. Assoc. Papers 20: 208-209 (June, 1937); Paper Trade J. 105, No. 6: 85-86 Aug. 5, 1937).—The method consists essentially in comparing the color produced by adding sodium hydroxide to a water extract of the paper with standards prepared from potassium bichromate and Congo red solution.—A.P.-C.

Instrumentation Studies. XII. Adaptability of the G. E. Reflection Meter as a Color Analyzer. 2. Factors Influencing the Accuracy of Measurements on the General Electric Reflection Meter. Staff of the Institute of Paper Chemistry. Paper Trade J. 104, No. 19: 51-63 (May 13, 1937).—The theory of the reflectance measurements is treated for both instruments, and the discrepancies between the instrumental results to be attributed to various factors are estimated. The results of the study show that, for most colors encountered in the manufacture of paper, the reflection meter with the addition of the auxiliary heat filter can be accurately used as a color analyzer.—A.P.-C.

Instrumentation Studies. XIII. Adaptability of the G. E. Reflection Meter as a Color Analyzer. 3. Effect of Infra-Red Fluorescent Radiations Upon "Brightness" Measurements Obtained with the G. E. Reflection Meter. Staff of the Institute of Paper Chemistry. Paper Trade J. 104, No. 20: 45-49 (May 20, 1937).—The error in brightness determination caused by fluorescent infra-red light is carefully analyzed, and it is shown that this error is of a variable nature and is sometimes seriously large. The simplest means of completely eliminating this error is the addition to the reflection meter of a special infra-red stopping filter.—A.P.-C.

Instrumentation Studies. XIV. A Comparison of the Smith-Taber and the Gurley Stiffness Testers. Staff of the Institute of Paper Chemistry. Paper Trade J. 104, No. 21: 43-47 (May 27, 1937).—It appears that results are more reproducible on the Gurley than on the Smith-Taber instrument. The sensitivity of the Gurley can be varied over a larger range than on the Smith-Taber. The outside limit of accuracy is 5 per cent for the Smith-Taber and 3 per cent for the Gurley.—A.P.-C.

Insrumentation Studies. XV. A Comparison of the Carter and the Gurley Stiffness Testers. The Staff of the Institute of Paper Chemistry. Paper Trade J. 104, No. 22: 43-45 (June 3, 1937).—The values obtained with the Carter tester are very nearly proportional to the readings of the Gurley, the curves obtained being very nearly straight lines. These curves may be used as calibration curves to give the Gurley reading for a given Carter reading. The range of the Carter is less than that of the Gurley.—A.P.-C.

Instrumentation Studies. XVI. The Correlation Between the Degree of Sizing as Determined by the Valley, TAPPI, and Currier Methods. Staff of the Institute of Paper Chemistry. Paper Trade J. 104, No. 23: 45-46 (June 10, 1937).—A study carried out on 6 different grades of paper showed that only a very general correlation exists between the results obtained by the three methods. Considering all grades tested, the correlation between the Valley method and the other two is much more erratic than the correlation between the Currier and TAPPI methods. The difference in reproducibility is not great, that of the TAPPI method being somewhat better than that of the Valley method. Five determinations on each sample give a sufficiently accurate average results.—A.P.-C.

Instrumentation Studies. XVII. A Study of the Transparency of Tinted White Glassine Papers and the Development of an Instrument for its Measurement. Staff of the Institute of Paper Chemistry. Paper Trade J. 105, No. 2: 41-48; No. 3: 35-44 (July 8, 15, 1937).—An exhaustive study is made of the method and factors included in the judgment of the relative transparency of two sheets, the optical properties of the sheet which influence transparency, the theoretical expression and limitations thereon for the intensity of the light transmitted by a diffusing medium, the uses of total transmittance, contrast ratio and image visibility as measures of transparency. The use of another new quantity, transparency ratio (ratio of parallel to total transmittance), is presented. The specifications of a transparency tester are given, and an instrument based on these specifications and constructed for the measurement of both parallel transmittance and transparency ratio is described; it consists essentially of a tungsten filament lamp, a simple 50-mm. total length centered lens, a sample holder, a Weston Photronic cell ("visibility" sensitivity), and diaphragms. The theoretical treatment of the definition and measurement of parallel and total transmittance and transparency ratio is presented, and it is emphasized that the quantities are defined by the instrument used in the measurement. It is concluded that parallel transmittance is a good single measure of the transparency of tinted white glassine sheets and can be used for mill control of paper of this class; the measurement of transparency ratio, which may be extended to include colored sheets, is to be preferred as the best general measure.—A.P.-C.

Uses and Limitations of Some Paper-Testing Instruments. R. A. Ainslie. World's Paper Trade Rev. 107: TS8-12, 28-32 (April 30, May 21, 1937); Paper Maker 93: TS26-31 (Feb., 1937).—A discussion of factors affecting the results obtained with the following instruments: paper scales and micrometer; bursting, tensile, and tearing testers; and the air porosity tester; together with a discussion of the effect of variations in relative humidity during testing. Bibliography of 20 references.—A.P.-C.

The Cobb Sizing Tester. L. Egy. Pulp Paper Mag. Can. 38: 499-501 (June, 1937.—A description of the instrument and the method of carrying out the test, with a discussion of test conditions and of the accuracy and advantages of the method.—A.P.-C.

Instrumentation Studies. XVIII. Rate of Penetration of Oil Through Paper. Staff of the Institute of Paper Chemistry. Paper Trade J. 105, No. 8: 39-42 (Aug. 19, 1937).—An instrument for

measuring the total diffuse light transmission of papers has been constructed. The arrangement is such that an oil grease film may be applied to the paper and transmission may be measured as a function of time after application of the film. Rates of oil penetration may be computed, and illustrative figures are given. The design of the instrument is based on the finding that the exponential law of light absorption obtains when the paper is illuminated by a white, diffusing opal glass in immediate contact with the paper. Tests which justify the application of this law are given, and a formula for computing oil penetration speed is derived.—A.P.-C.

Instrumentation Studies. XIX. Photoelectric Device for the Objective Measurement of Light Scattered by Small Particles and Surface Fuzz of Paper. Staff of the Institute of Paper Chemistry. Paper Trade J. 105, No. 9: 33-35 (Aug. 26, 1937).—An efficient optical arrangement for the measurement of light scattered by small particles has been developed. The device is sufficiently sensitive to measure quantitatively the light scattered from an isolated fiber. Application may be made to the measurement of turbidity of liquids of very low turbidity. A new photoelectric instrument specifically designed for the objective measurement of surface fuzz of paper has been found very effective. The instrument is described and examples of results obtained with it are given.—A.P.-C.

Air Infiltration through Insulating Board. L. K. Arnold. Paper Trade J. 105, No. 4: 40-42 (July 22, 1937).—A description is given of the design and operation of an apparatus for testing the wind infiltration of board. Infiltration was measured by observing the time required for air passing through the board under a given pressure differential to produce the maximum displacement in the gas holder and calculated in terms of cu. ft. per sq. ft. per hr. Data are presented on the infiltration through samples of 4 different commercial insulating boards. Tests on semi-commercial cornstalk board showed that, on the whole, addition of waste paper decreased air infiltration and that increase in density of the board decreased infiltration.—A.P.-C.

Instrument for Testing the Compression Strength of Corrugated Board. Samuel Vadner. U.S. pat. 2,078,296 (April 27, 1937).—The invention provides an attachment which can be adapted to an ordinary Mullen tester for determining the compression strength of corrugated fiber board. It consists essentially of a lower compression plate which rests on the diaphragm and an upper compression plate which replaces the usual clamping ring. The test piece is placed between the two plates and pressure is applied. The compression strength may be estimated either from the pressure required to produce compete crushing or from the pressure which produces a given decrease in thickness as measured by a micrometer suitably mounted on the lower plate. (Cl. 265-14).—A.P.-C.

Testing and Evaluation of Artificial Leather and Leather Substitutes. Chem.-Ztg. 61, no. 43:445-447 (May 29, 1937); Bull. Inst. Paper Chem. 7:377.—A review is given of physical and chemical testing methods for evaluating artificial leather. According to the German definition, the term includes either tissues or feltlike substances from vegetable or animal fibers with properties similar to leather and a waterproof coat with a cellulose base, or boards prepared with at least 40 per cent genuine leather fiber. All other products fall within the scope of "leather substitutes." Physical testing methods include tearing strength, resistance to tear where stitched, to water, moisture, and wear in dry and wet condition, and flexibility. Chemical methods cover the absence of strong free acids and substances harmful to health, as well as the detection of the individual components; satisfactory procedures for the determination of cellulose fibers and synthetic resins do not yet exist.—C.J.W.

Detection of Tannin in Colored or Printed Papers. Fritz Burgstaller. Wochbl-Papierfabr. 68, No. 16; 298 (April 17, 1937); Zellstoff u. Papier 17, No. 5: 198-99 (May, 1937).—After discussing the reasons for the use of tannin in paper, the author describes in detail methods for its detection.—J.F.O.

The Sampling of Wood for Analysis, with Particular Reference to the Australian Eucalypts. A. Bryant. Biochem. J. 31: 748-754 (1937).—Any grinding operation applied to wood tends to detract from the accuracy of the cellulose and lignin determinations. The effects are most marked in wood that has been ground to a small particle size. If grinding is necessary, a minimum of fine dust should be produced and this discarded. The selection of wood flour of 80 to 100 or 60 to 80 mesh for analysis can hardly be improved upon.—A.P.-C.

Physical-Chemical Methods for Mill Control in the Pulp and Paper Industry. Determination of Chloride and Hypochlorite with the Transition Electrode. Kurt Schwabe. Wochbl. Papier fabr. 68, Special Number: 29-32 (July 2, 1937).—Detailed description of the methods for determining chlorides and hypochlorites with the transition electrode.—J.F.O.

The Development of the Strength Testing of Pulp. G. Jayme. Papier-Fabr. 35, no. 23: 193-97 (June 4, 1937).—A brief comparison of the strength testing methods for pulp, used in the chief pulp producing countries; the apparatus used for each test and the comparative results obtained therefrom. —J.F.O.

Testing Methods for Pulp and Ground Wood. David Johansson, Zellstoff u. Papier 17, no. 7, 286-89; no. 9: 389-92; no. 10: 436-38 (July, Sept., Oct., 1937).—The author first discusses the physical testing methods for pulp, describing in detail where the English, German and Scandinavian standard methods differ, the various instruments for testing the test sheet of pulp; a comparison of Thwing Elmendorf, the Marx Elmendorf and the Brecht Imset tear testers; the whiteness or brightness test results by the G.E. Reflection Meter and a European make are compared with results that give a straight line curve; various chemical tests on pulp are discussed such as alpha cellulose, viscosity, degree of polymerization. The wetness tester for ground wood, the strength test, fractionation of fibers and the determination of screenings are described.—J.F.O.

Quick Method for the Determination of the Copper-Viscosity of Pulps. F. Schutz, W. Klauditz, and P. Winterfeld, Papier-Fabr. 35, no. 15: 117-21 (April 9, 1937).—For most accurate results with the present copper-viscosity method, the solutions and test should be conducted in the absence of oxygen. This new method can be used as a control test during the bleaching and other processes, the time to carry out the test requires 30 to 35 minutes. Complete description of method and apparatus are given.—J.F.O.

The Microscopical Detection of Rosin in Pulp. Committee for Fiber Analysis, Association of Pulp and Paper Chemists and Engineers, Germany. Papier-Fabr. 35, no. 29: 293-95 (July 19, 1937).—A method is described for the microscopical analysis of rosin in pulp by staining with either of the following dyestuffs; Sudanorange RR, Sudanblack B, or Indophenol. The earlier work done, the preparation of the stains and its application on the fiber are described in detail.—J.F.O.

Concerning the Stabilization of the Wood Reactions Most Used. Kurt Lohwag. Papier-Fabr. 35, no. 34: 327-28 (Aug. 20, 1937).—Under certain conditions, the aniline sulphate reaction can be maintained unchanged, and also a combination of this reaction with a red chloration of the parenchymatic elements by mucicarmin is possible. The phloroglucin hydrochloric acid reaction is more labile, in glycerin it will remain unchanged for a few days while in Canada balsam for about one month. Both of the above reactions are more stable with coniferous woods than with deciduous. The maganate reaction "Maule Reaction" did not respond to any stabilizing agents.—J.F.O.

Report of Fiber Identification Symposium. Anon. Paper Trade J. 105, No. 15: 28-37 (Oct. 7, 1937).—A summary of the work done by TAPPI members at the Fiber Symposium held at the Institute of Paper Chemistry, Appleton, Wis., June 9-17, 1936, the work consisting mainly of a study of the application of the Graff stains for the identification of fibers (Paper Trade J. 100, No. 16, 45-50—April 18, 1935).—A.P.-C.

Progress Report of Paper Testing Committee for 1936-37. B. W. Scribner. Tech. Assoc. Papers 20: 166-167 (June, 1937); Paper Trade J. 105, No. 12: 42-43 (Sept. 16, 1937).—An outline of the work done by the committee on the development of various standard methods.—A.P.-C.

Microscopy of Paper. John B. Calkin Tappi Special Bibliography Series No. 1. 47 p. 1937.—A classified bibliography.—A.P.-C.

Standard Outline for the Testing of Paper. R. Korn. Wochbl. Papier-Fabr. 68, no. 36: 675-77 (Sept. 4, 1937).—The taking of the samples of paper for testing, the size of the samples and number of each test to be made, the expressing of the results and the conditions of the test are given.—

The Measurement of the Porosity of Paper and Other Porous Membranes. Alan A. Goldberg. J. Soc. Chem. Ind. 56: 249-252T (July, 1937).—An absolute unit of measurement for the porosity of paper is proposed and is termed the "por" it is defined as the number of cc. per sec. of gas through a sq. cm. of membrane under a unit driving pressure of 1 dyne per sq. cm. The principles on which the measurement of paper porosity by constant-pressure and by varying-pressure instruments are based are considered, and it is shown that the results obtained by both types when this unit is used would be identical. The conclusions are confirmed by experimental data.—A.P.-C.

Stiffness Tester. Ralph A. Masten, assignor to International Paper Co. U.S. pat. 2,092,809 (Sept. 14, 1937).—The test sheet, of definite length, is clamped on a rotatably mounted arm. A freely movable pointer pivoted coaxially with the arm has one end positioned so as to contact the free end of the test sheet. The arm is rotated so that the test strips causes a deflection of the pointer until the deflection or bending of the strip causes it to slip off the end of the pointer arm. The stiffness of the test strip is obtained from the maximum deflection of the pointer. (Cl. 265-17).—A.P.-C.

Color Calibration Machine. Fred A. Rogers, assignor to Rainbow Laboratories. U.S. pat. 2,084,598 (June 22, 1937).—The invention provides a simple apparatus for measuring numerically departures from a fixed color standard. It consists essentially of a casing in the top of which are two openings over which may be placed two cups holding the standard and the sample respectively. An adjustably mounted exciter lamp inside the casing projects light against the bottom of the cups. A photoelectric cell is mounted under each cup to receive the light reflected from the material in the respective cups. The cells are connected in a single circuit comprising a galvanometer and suitable resistances, and the negative pole of one cell is connected to the positive pole of the other. (Cl. 88-14).—A.P.-C.

Latest Laboratory Instruments for the Pulp and Paper Industry. Kurt Berndt. Zellstoff u. Papier 17, No. 7: 309-14; no. 8: 349-52 (July, August, 1937).—The instruments, whose construction, operation and use are described in detail are, the Metaphot, Panphot and Ultraphot which are camera microscopes, whiteness or brightness testers as the Pulfrich photometer, electrical apparatus for measuring pH, the Hoppler viscosimeter and the Ubbelohde viscosimeter, comparison of papers at various relative humidities, endurance bending tester by Schopper, steam permeability testing apparatus by Staedel and a stiffness tester.—J.F.O.

Method of Determining the Bending Elasticity of Pliable Material, Especially of Carton Paper. F. Schoeller. Ger. pat. 646,253 (May 16, 1934).—J.F.O.

The Air Permeability of Various Papers and Nitrocellulose Membranes. Erich Manegold and Karl Solf. Papier-Fabr. 35, No. 34: 321-27 (Aug. 20, 1937). The authors go to great lengths in defining the terms used in the hollow space system and all types of hollow spaces are discussed with illustrations of each. The capillary system is characterized with numerous equations, calculations for the average canal width, and in conclusion the experimental determination of water and air permeability.—J.F.O.

New Optical Instruments for the Testing of Paper and Fibers. O. Neese. Papier-Fabr. 35, no. 21: 177-78 (May 21, 1937).—The following optical instruments are described, their operation and use; the Leukometer, a photoelectric instrument for measuring the whiteness; an instrument for the microscopic observation of the contents of beaters; the Ultrarophot, a microscope and for microphotography, and a spectrographic apparatus for the qualitative and quantitative investigation of material of every kind for its chemical composition.—J.F.O.

The Zeiss Comparison Microscope for Paper Microscopy. Bruno Schulze. Wochbl. Papier-Fabr. 68, no. 25: 466-67 (June 19, 1937); Papier-Fabr. 35, no. 25: 219-220 (June 18, 1937); Zellstoff u. Papier 17, no. 9:399-400 (Sept., 1937).—Description of a microscope with which it is possible to view two different fields simultaneously; thus making it possible to compare two stocks for degree of beating or for fiber analysis.—J.F.O.

Concerning the Determination of the Sizing, that is, the Water Permeability of Papers. August Noll and Kurt Preiss. Papier-Fabr. 35, no. 25: 213-19 (June 18, 1937).—General observations of the coating test. The part sugar plays as the carrier of the indicator and other indicators of various types. The part dyestuffs plays in the dry indicator test. Indication of the water permeability of papers by the chemical reaction with the carrying substance of the indicator. General viewpoints of the testing methods. The standard floatation bath as a new apparatus, description of its operation and results of experiments. —J.F.O.

The Calculation of the Spectral Reflectivity of Dyed Hand Sheets. Philip Nolan. Tech. Assoc. Papers 20: 336-339 (June, 1937); Paper Trade J. 105, No. 14: 42-45 (Sept. 30, 1937).—The theoretical equation of Kubelka and Munk for the reflectivity of a medium in terms of its absorption and scattering coefficients was applied to the problem of calculating the spectral reflectivity of hand sheets containing two or more dyes, from the spectral reflectivities of hand sheets containing the individual dyes. The assumptions made in order to arrive at the results are stated and the theoretical conditions for the experimental observation of the difference between the spectral absorption coefficients of a dye in water solution and that absorbed on the fiber are set forth. Good agreements was obtained between experimental and theoretical spectral reflectivities of hand sheets of unbleached sulphite dyed with mixtures of two basic dyes. Experimental curves are presented to show the difference between the spectral absorption coefficients of methylene blue when it is in water solution and when it is adsorbed on unbleached sulphite fiber.—A.P.-C.

Apparatus for Measuring the Fiber Content of Waste Mill Waters. Carl B. Thorne. U.S. pat. 2,090,077 (Aug. 17, 1937).—The apparatus consists essentially of: (1) a revolving perforated plate cylinder to remove large coarse particles; (2) a revolving-screen fiber separator (of the type described in U.S. pat. 1,826,485); (3) a fine-screen cylinder; and (4) a suitable weighing mechanism which receives the fibers from the screen cylinder and which may be connected to an appropriate indicating or recording device. (Cl. 73-51).—A.P.-C.

Beaters and Beating

Problems of the Theory of the Beater. Hanns Arledter. Wochbl. Papier-Fabr. 68, no. 23: 427-29; no. 24: 445-46 (June 5, 12, 1937).—Observations concerning the relation of the beating time to the ability of the roll to move the stock, to the volume of the trough, the length of the cut and discussions of these factors from experimental results. The influence of the beating pressure on the beating time. The question of the power required for the beating and its significance. Pointing out the important factors when comparing the production of two beaters. Reports on experiments of a new beater system with reference to the ability of the roll to move the stock, the length of the cut and other factors in relation to the beating time. The power question with the new beater and experimental results concerning this. Speculation as to the possibilities of the new system.—J.F.O.

Investigations on Edgerunners (Kollergangs). Walter Brecht. Papier-Fabr. 35, no. 27: 259-70; no. 33: 313-20 (July 2, Aug. 13, 1937).—The most important operating conditions for the progress and success of beating are discussed. The experimental observation of the coarse and fine disintegrating work during beating shows the part played by the moisture content of the stuff and the capacity of the edgerunner at different moisture contents. The variations taking place during beating are also discussed. Numerous curves accompanies the article.—J.F.O.

Problems of the Theory of Beating. Hanns Arledter. Wochbl Papier-Fabr. 68, No. 34: 637-39; no. 37: 695-97; No. 38: 712-13 (Aug. 21, Sept. 11, 18, 1937).—The significance and calculation of the beating roll pressure, the question of the power required in the beater, comparison of the output of two beaters, and in conclusion, the author describes in great detail, the operation and performance of a spherical beater which has big advantages over the present types of beaters.—J.F.O.

Device for the Automatic Determination of the Degree of Beating of Paper Stock. N. Wunderlich, Ger. pat. 646,656 (Oct. 7, 1934). A cylindrical screen is submerged in the stock in the beater and a float is contained within the cylinder.—J.F.O.

Centrifuge Mill for the Beating of Fiberous Materials, Especially for the Manufacture of Paper. Louise Biffar. Ger. pat. 646,437 (Dec. 15, 1935).—Means of changing the tackle of the centrifuge beater.—J.F.O.

Beating Device for the Continuous Beating of Paper and Similar Substances, Firma J. M. Voith, Heidenheim. Ger. pat. 643,731 (June 14, 1935). Besides the regular inlet for the stock in jordans, another movable inlet is provided which can be regulated according to the stock to be beaten.—J.F.O.

Pulp Stock Agitation. John A. Rosmait. U. S. pat. 2,092,263 (Sept. 7, 1937).—The invention comprises a large storage tank through which pulp stock is continually passed in one direction and recirculated. A circulatory system is associated with the chest and is arranged to discharge pulp into one end of the tank and withdraw it from the other. A baffle inside the chest directs the flow of stock to areas and corners where pulp would be likely to deposit and clog the chest. (Cl. 92-37).—A.P.-C.

Continuous Beater. Wilhelm Thaler, assignor to American Voith Contact Co. U.S. pat. 2,092,821 (Sept. 14, 1937).—In a beater wherein the stock is made to pass repeatedly between the same roll and bedplate, the stock is fed to the roll in a narrow stream, and after the first passage between the roll and bedplate the stock is deflected by means of an adjustably inclined wall so that in following passages it is progressively displaced sideways across the face of the roll. (Cl. 92-22).—A.P.-C.

Relationship Between the Alkali Solubility and Rate of Beating of Sulphite Pulp. F. W. Klingstedt. Svensk Pappers-Tidn. 40, no. 17:412-416 (Sept. 15, 1937); B.I.P.C. 8:95.—The effect of the alkali-soluble constituents of sulphite pulps on the rate of hydration and strength properties is discussed. A relation between beating time, B-cellulose, and solubility in alkaline liquors ranging in strength from 5 per cent to 17.5 per cent is shown. The pentosan content and degree of cooking of the pulp, as measured by the Enso number, apparently have no effect on either the beating or maximum strength. More detailed experimental methods are needed to more fully evaluate these phenomena.—C.J.W.

The Vortex Beater. D. B. Wicker. Paper Trade J. 104, No. 23: 47-53 (June 10, 1937).—The functions of the mill beater as a disintegrator, mixer and mechanical treater are discussed. The Vortex beater is described as an engine designed with the principle of the screw press utilized for disintegrating and forcing the stock into the zone of action, and that of the centrifugal pump for circulating. Its practical advantages as a compact, closed and efficient integral unit are pointed out. Beater tests comparing the action of a Vortex with steel fillings and one with stone fillings, with that of a hollander with a granite bedplate, are presented. Comparative tests on the refined stocks and power consumption figures are given.—A.P.-C.

The Jones-Bertram Patent Beater. George H. Spencer. Paper Mill 60, No. 26:100-104 (June 26, 1937).—A description of the development and design of the machine—A. P.-C.

Economies Effected By Use of Geared Drives on Beaters. H. E. Dralle. Paper Industry 19: 316-317 (June, 1937).—A brief discussion.—A.P.-C.

Stuff Treatment Apparatus. Charles P. Tolman assignor to The Noble & Wood Machine Co. U. S. pats. 2,087,556-2,087,561 (July 20, 1937).—Stock is delivered under pressure sufficient to overcome the centrifugal counter force developed, into contact with a portion of the peripheral surface of a high speed rotor (5000 ft. per min. or more) provided with transverse peripheral grooves. A quantity of stock is thus forced into each rotor groove and carried into a film-shearing gap or treating zone formed between the rotor periphery and a suitable bedplate or bedplates spaced therefrom a distance of the order of 0.005 in. In this zone the entire contents of each groove are subjected to a uniformly effective defibering and finishing action under pressure, and is then discharged from the treatment zone with sudden and material decrease in pressure. Means are provided for controlling and adjusting the feed pressure, the distance of the bedplates from the rotor (either individually or collectively), the pressure of the bedplates on the rotor and the speed of the rotor. The several patents refer to various features in the design and construction of the apparatus. (First 5, Cl. 92-26; last Cl. 83-14).—A.P.-C.

Beater. Walter N. Sherwood. U. S. pat. 2,078,030 (April 20, 1937).—In front of the roll there is provided a pivotally mounted dam extending across the full width of the trough so as to deliver the stock between the roll and bedplate in the form of a thin flowing sheet. Just back of the bedplate is an upwardly inclined guide plate which directs the stock upwardly and rearwardly as it leaves the roll. The trough passes beneath the roll and bedplate, and the walls are shaped to eliminate all angles and facilitate the travel of the stock. (Cl. 92-25).—A.P.-C.

Intercepting Member for Paper Stock Treating Machines. Archer LeRoy Bolton, assignor to John W. Bolton and Sons, Inc. U. S. pat. 2,078,218 (April 27, 1937).—The relatively smooth faces of the pockets which are formed between the knives or bars of a beater engine roll, a bedplate, or a jordan shell or plug are roughened, suitably by knurling or by forming criss-cross grooves or channels. (Cl. 92-22.).—A.P.-C.

Contribution to the Theory of Beating. Ernst Schmidt. Wochbl. Papierfabr. 68, No. 18: 339 (May 1, 1937).—Description of a new patented beating tackle which can be applied to almost any type of beater and which increases the beater capacity and lowers the power consumption.—J. F. O.

Bleaching

Kamyr Bleaching. Papier-Ztg. 62, no. 31:542 (April 17, 1937); Bull. Inst. Paper Chem. 7:326.—The process is essentially a three-stage bleach employing four concrete towers. The first is used for the chlorination of the pulp, the second for neutralization with alkali and an after treatment, the third and fourth for an after bleach with chloride of lime. A specially constructed pump wheel conveys the pulp through large size pipes from one tower to the other. In some plants the temperature in the second tower reaches 80-90 degrees C.; in this case the concrete must be protected against the attack of the alkaline liquor, for instance by a rubber lining on the inside walls.—C.J.W.

Bleached Sulphate Pulp. Zentr. Papierind. 55, no. 9:99-101 (May 1, 1937); Bull. Inst. Paper Chem. 7:326.—Brief reference is made to the manufacture of bleached kraft pulp and its properties. Highly purified sulphate pulps from pine have already been used for producing rayon, nitrocellulose and cellulose esters.—C.J.W.

Remarks Concerning the Bleaching of Pulp. Kurt af Schulten. Finnish Paper and Timber J. 18, no. 9:426-428, 430, 432, 434-435 (May 15, 1937); Bull, Inst. Paper Chem. 7:368.—With brief reference to the enormous growth in the output of both bleached sulphite and sulphate pulp during recent years, the author discusses certain important phases of the process. He found that, independent of the cooking degree and method, all kinds of pulp can be bleached to the best possible color for each kind without appreciable decrease in strength. In order to obtain the best bleaching results with both sulphite and sulphate pulp, a treatment with chlorine and alkali should precede the bleaching process. The hypochlorite stage should be carried out at medium or high pulp concentration and at the lowest possible chlorine concentration, in a weakly alkaline solution, at a temperature between 30 and 35 deg. C. Stirring and circulation during the bleaching process are not necessary and may be even harmful. Of the various strength properties of the pulp, tearing strength is the most readily affected by hypochlorite bleach, followed by folding endurance, bursting strength, and breaking length.—C.J.W.

Recent Development in the Bleaching of Kraft. John D. Rue. Paper Trade J. 104, No. 25: 19-20. (June 24, 1937).—A brief review.—A.P.C.

Progress In Bleaching Kraft Pulp. Brian Shera. Paper Mill 60, No. 1: 14-16 (Jan. 2, 1937).—A brief review.—A.P.-C.

Designing a Plant for Bleaching Sulphite Pulp. Walter L. Savell. Paper Mill 60, No. 26:119-139 (June 26, 1937); Paper Trade J. 105, No. 1: 113-118 (July 1, 1937).—An outline of the elements inolved and principles which may be followed in establishing the design of a sulphite bleaching plant satisfactory for a given set of conditions.—A.P.-C.

Bleaching Paper Pulp. James F. White assignor to Mathieson Alkali Works. Can. pat. 365,873 (May 4, 1937).—Sulphite pulp is incompletely bleached with chlorine in an aqueous medium, treated with an alkali in aqueous solution, and the bleaching completed with an aqueous chlorite solution of pH ap-

proximately 3.5 to 5.0 at about 45 deg. C.—A.P.-C.

Bleached Cellulosic Product. John Campbell and Lancelot O. Rolleston, assignors to International Paper Co. U. S. pat 2,081,267 (May 25, 1937).—Pulp (more particularly sulphate pulp) is dewatered to a consistency of not less than 15 per cent (preferably 30 to 40 per cent), subjected to vacuum, and treated with chlorine gas. Prior to or during evacuation, the pulp may be impregnated with a suitable quantity of caustic soda solution to react with the chlorine and produce an active bleaching agent in the nascent state. The treatment with chlorine is allowed to proceed for only a short period, and may be repeated once or oftener if required. (Cl. 82-3).—A.P.-C.

Continuous Pulp Bleaching Process. Johan Cristoffer F. C. Richter and Karl W. Rosén, assignors to Aktiebolaget Kamyr. U. S. pat. 2,078,810 (April 27, 1937).—The pulp to be treated with chlorine is introduced continuously, together with the chlorine, into a circulating quantity of pulp, the circulation chamber of the apparatus being connected with a rising pipe or vessel through which the chlorine-treated pulp moves upwards and is continuously removed at the top after a suitable period of reaction. The process may suitably be carried out by means of an apparatus comprising a tank, the bottom of which is formed by an open annular channel which communicates at two points with the suction and pressure side of a circulation pump, the suction side of which is also connected with a conduit for continuous supply of unbleached or partly bleached pulp and with a pipe for the supply of chlorine gas. (Cl. 8-2).—A.P.-C.

Pulp Bleaching Process. Francis J. Cirves. U. S. pat. 2,083,294 (June 8, 1937).—An alkaline reagent is mixed with pulp, and chlorine is injected into the mixture at the point of greatest agitation to produce nascent hypochlorite in direct contact with the fibers. (Cl. 8-2).—A.P.-C.

Pulp Bleaching Process. C. B. Thorne. Belg. pat. 419,504 (Feb. 27, 1937).—Paper pulp is mixed with a bleaching agent and is passed continuously through two or more containers, the first of which acts as absorption zone which permits of regulating the time of absorption to the nature of the pulp and the purpose for which is is intended.—A.P.-C.

Bleaching Cellulose. François J. M. A. Alquié Fr. pat. 807,858 (Jan. 23, 1937).—The incrusting materials are removed by chlorination, the chlorinating liquor being maintained at a determined pH value by the addition of a buffer.—A.P.-C.

Bleaching of Sulphite Pulp with Chlorine Gas. N. N. Nepenin and V. V. Yakimanskii. Tsentral. Nauch.-Issledovatel. Inst. Bumazh. Prom. Materialy 1937, no. 22:80-125; C. A. 31:7643.—From the results if comparative bleaching tests by the combined, single-stage and two-stage bleaching processes a preference is expressed for the combined process of Rue and Sconce. In bleaching of soft and medium-hard pulp by this procedure better results are obtained by direct chlorination, with stirring, of a 3 per cent pulp suspension with a fine spray of chlorine than by macerating the pulp in chlorine solution. In the intermediate alkaline treatment chlorolignin and soluble products are more rapidly and completely removed by washing the chlorinated pulp with sodium hydroxide than with calcium hydroxide. In the subsequent bleaching with hypochlorite, the treatment with sodium hypochlorite in slightly alkaline medium (0.025-0.05 per cent sodium hydroxide) gives bleached pulps of superior chemical and physical properties than that with calcium hypochlorite. Pulps can be stabilized with chlorine gas or neutral calcium hypochlorite. This treatment does not improve the chemical properties of bleached pulps but tends to intensify and reinforce the whiteness obtained by bleaching. No more than 0.05 per cent chlorine on the weight of pulp is required for the stabilization. The combined bleaching as compared with the typical hypochlorite process results in 2-4 per cent decreased pulp yields and slightly more contaminated products, because of the incomplete bleaching of the woody matter as a result of the accelerated bleaching rate. This necessitates a more careful selection or sorting of the pulp. Forty references.—C.J.W.

Bleaching of Sulphate Pulp. N. A. Rozenberger and A. G. Laube. Tsentral Nauch.-Issledovatel. Inst. Bumazh. Materialy 1937, no. 22:126-160; C. A. 31:7643.—In agreement with the findings discussed in the preceding abstract, the best results in bleaching of sulphate pulp of different hardness by various methods are obtained by the Rue and Sconce combined bleaching process. The resulting bleaching pulp contains about 90 per cent alpha-cellulose and shows satisfactory whiteness and mechanical and chemical properties. Depending on the degree of bleaching, it can be used in making of writing and printing paper and high-grade wrapping paper. Because of somewhat higher contents of pentosans, it cannot be used for chemical reworking without a subsequent refining. The operation and construction of the installation by International Bleaching Corporation for combined bleaching of pulp are discussed.—C.J.W.

Concerning the Bleaching of Ground Wood with Special Reference to a New Process. K. Meltzer. Papier-Fabr. 35, no. 30: 297-301 (July 27, 1937). Factors in the preparation of ground wood effecting the color are discussed. Chlorination is undesirable since the lignin is eventually washed away, the use of sulphur dioxide gas alone has the disadvantage that air and light and heat changes the color back to its original. The sodium bisulphite process is described in detail and then the zinc hydrosulphite process with its advantages over the bisulphite. Since zinc hydrosulphite is not stable in the atmosphere, a new process has been invented which uses the zinc in the form of fine dust, mixes it with the material to be bleached and then introduces sulphur dioxide to the entire contents. A mill using the latter process has been in successful operation for several years.—J.F.O.

Bleaching of Pulp. Zellstoff A. Papier 17, No. 7: 292-94 (July, 1937).—Independent of the manner of cooking, a pulp can be bleached to the highest possible whiteness without appreciably lowering the strength. For sulphate as well as sulphite, a pretreatment with chlorine and alkali gives the best results. Bleaching with hypochlorite should be carried out with medium or high density and with as little chlorine concentration as possible and at a slightly alkaline reaction between 30 and 35 deg. C. Agitation and circulation of the stock is unnecessary and might even be harmful. For each pulp, sulphite and sulphate, there is an optimum for the amount of chlorine to add in the chlorination stage.—J.F.O.

Method for Measuring, Registering or Regulat-

ing the Content of Bleaching Material in Bleach Baths. Kubler & Niethammer. Ger. pat. 645,482 (June 14, 1934). The potential difference between electrods, one being placed in the bleach bath and the other is the comparator, is measured and transmitted to a regulating device if desired.—J.F.C.

Process for the Manufacture of Pulp With a High Content of Alpha Cellulose. I. G. Farbenindustrie A. G., Frankfurt a.M., Germany. Nor. pat. 57,150 (Sept. 18, 1933).—After a pre-bleaching of the pulp, it is treated with a 5 to 10 per cent solution of sodium hydroxide in the presence of an oxydizing bleaching material. Gaseous chlorine is used in both steps of the process.—J.F.O.

Preparation of Bleach Liquor in a Continuous Process. Deutsche Solvay Werke A.G., Bernburg. Swed. pat. 88,127 (Nov. 27, 1934). By the quick and uniform action of chlorine on a continuous counter current flowing solution of hydroxide, hypochlorite, carbonate, bicarbonate of the alkalies or earth alkalies; a solution containing free chlorine is obtained, provided the chlorine is admitted into the apparatus in the right amounts.—J.F.O.

Ozone Apparatus for Factory Use. Fritz Loewe. Wochbl. Papier-Fabr. 68, no. 26: 488 (June 26, 1937) General discussion of ozone, tube type and plate type apparatus for producing ozone and the uses of ozone.—J.F.O.

Purification of Cellulose. Antoine R. de Vains. Fr. pat. 808,232 (Feb. 1, 1937).—The chlorination of lignin in impure cellulose is controlled by the galvanic method. Preferably electrodes of zinc and copper are introduced into the pulp, discharged into a resistance and the fall of tension in the resistance is measured. When treated with caustic soda, the caustic soda concentration is also controlled by the galvanic method. During bleaching the reaction is followed with the same couple as for the chlorination.—A.P.-C.

Continuous Bleaching Process and Apparatus. John Campbell, Lancelot O. Rolleston and George A. Smith, assignors to International Paper Co. U.S. pat. 2,089,992 (Aug. 17, 1937).—The invention provides an apparatus for carrying out the pulp bleaching process of U.S. pat. 1,957,937 in which the pulp is subjected to vacuum and then treated with a gaseous bleaching agent. An elongated reaction chamber is used, the pulp being continuously introduced at one point and withdrawn at another and forming a substantially air-tight plug in the chamber so that substantial pressure differences may be maintained at points in the chamber only a short distance apart. Two or more such chambers may be connected in series to effect bleaching in stages. (Cl. 8-2).—A.P.-C.

Boards

Splitting of Boards. H. Postl. Pappen- u Holzstoff-Ztg. 44, No. 7: 74-75 (Feb. 12, 1937.)—Splitting takes place when the individual layers of the board do not felt sufficiently with each other during manufacture. This trouble occurs chiefly with thick products prepared upon cylinder machines; thin boards and those manufactured upon Fourdrinier machines are less liable to split. Operating hints are given with regard to treatment of different raw materials, pressing and drying for minimizing the splitting tendency.—C.J.W.

Manufacture of Cylindrical Cardboard Cores. Papier-Ztg. 62, No. 15: 222, 224, 226, 228 (Feb. 20, 1937).—Different types of machinery for manufacturing cylindrical cardboard cores are described.—C.J.W.

Container Board. H. Postl. Pappen- u. Holzstoff-Ztg. 44, No. 2:22-23; No. 3: 31-32 (Jan. 8, 15, 1937). The article gives a detailed description of the manufacture of container board, including raw materials, directions for the use of the cylinder and Fourdrinier machine, and drying, couching, and laminating operations.—C.J.W.

Explanation of Enormous Growth in Corrugated Production. J. D. Malcolmson. Fibre Containers 22, No. 2: 10-13 (Feb., 1937).—The phenomenal growth of the paperboard industry, especially during the period of the depression, is traced back to the application of intensive research and sales promotion. The container industry is continually looking for new outlets, the corrugated floor display stand being listed as one of the latest examples of this type. Directions are given for the successful application of this stand.—C.J.W.

First Soviet Mill for Production of Dielectric Fibreboard. B. A. Neimark, B. N. Moiseev and B. S. Liftman. Bumazhnaya Prom. 15, No. 9: 37-47 (Sept., 1936); C. A. 31: 2429. The layout, installation and the methods of production of various types of fiberboard for electrical insulation are described.—C.J.W.

Production of Fibreboard from Waste Tanbark Oak. L. A. Skul'skaya and S. P. Khvatt. Bum. azhnaya Prom. 15, No. 10: 38-44 (Oct., 1936); C.A. 31: 2429.—Waste tanbark oak cooked with 10 per cent lime at 90-100 deg. C. for 6 hours in mixture with waste paper up to 30 per cent or unbleached sulphate pulp up to 20 per cent gave fiberboard comparable in the mechanical properties with 100 per cent waste tanbark product obtained by pulping with 30 per cent recovered lye at 6 atmospheres for 12 hours.—C.J.W.

Paper Manufacture. Thomas R. LeCompte, assignor to John A. Manning Paper Co., Inc. U.S. pat. 2,069,766 (Feb. 9, 1937).—Up to 2 per cent of gum karaya, which has been treated wtih a mild alkali such as ammonia to partially or totally deacetylate it, is added to the furnish, and is claimed to produce better and more uniform formation.—A.P.-C.

Method of Finishing Composite Paper Sheet Material. George E. Gibbs, assignor to American Reenforced Paper Co. U.S. pat. 2,069,063 (Jan. 26, 1937).—Two layers of paper are secured together by a heated thermoplastic material (e.g., bitumen) either with or without interposition of reenforcing filaments. A moistening liquid is applied to one of the paper sheets, and the composite sheet is wound into a roll so that the added moisture becomes uniformly distributed throughout both paper plies.—A.P.-C.

Multi-Ply Construction Material Suitable for Sound Insulation. Charles A. Upson, assignor to The Upson Co. U.S. pat. 2,064,327 (Dec. 15, 1936).—A layer of strong and relatively rigid fibreboard is used together with layers of felt paper and octton batting.—A.P.-C.

Construction Material. (Charles A. Upson, assignor to The Upson Co. U. S. pat. 2,063,964 (Dec. 15, 1936).—Construction material for automobile tops and the like comprises a closely matted, porous, relatively tough, separately formed fibrous panel having a substantial degree of sound deaden-

ing, toughness, rigidity and resilience; and a separately formed facing ply permanently secured to the panel throughout substantially the entire common area of the two plies, the second ply being of weather-resisting sheet material treated to render it substantially impervious to water.—A.P.-C.

Composition of Matter and Methods of Making the Same. Thomas Robinson, assignor to Lancaster Processes, Inc. U. S. pat. 2,072,686 (March 2, 1937).—Wood chips are fed together with a relatively small amount of water to an internal mixer such as the Banbury mixer. When the wood has been reduced to the form of coarse fibers a bituminous binder is gradually fed into the mixing chamber, either in fluent form or as a solid, the amount being about equal in weight to that of the wood, and mixing is continued until the coarse fibrous material is reduced substantially to single fibers.—A.P.-C.

Flexible Veneers with an Enamel-Like Surface. John F. Dreyer, assignor to The Formica Insulation Co. U.S. pat. 2,062,088 (Nov. 24, 1936).—A thin sheet impregnated with a urea-formaldehyde resin is superposed on a thin sheet impregnated with phenolformaldehyde, which in turn is superposed upon a sheet impregnated with polymerized vinyl chloride and the materials are united by heat and pressure.—A.P.-C.

Apparatus for Making Corrugated Paperboard. George W. Swift, Jr., assignor to George W. Swift, Jr., Inc. U. S. pat. 2,068,155 (Jan. 19, 1937).—In order to hold the moist freshly-corrugated sheet securely in contact with the corrugating roll during application of the liner, the roll is provided with a number of circumferential grooves which intersect the corrugations of the roll in transverse planes. Stationary suctions nozzles project into the grooves. —A.P.-C.

Method of Making Artificial Lumber. James V. Nevin. U.S. pat. 2,068,926 (Jan. 26, 1937).This is an improvement on U. S. pat. 1,899,768 of Feb. 28, 1933. Waste wood is disintegrated in a wet state. A water-soluble, partial condensation product (suitably of formaldehyde and cresylic acid) is distributed uniformly throughout the mass so as to impregnate the fibers. A precipitating agent is added, the fibers are felted into a sheet which, after removal of as much water as possible by mechanical means, is subjected to heat and pressure to convert the condensation product into a resin. —A.P.-C.

Cellulose and Lignin

Hemicellulose and Its Determination in Alkali Cellulose Used in the Manufacture of Rayon. Francesco Castellani. Bull. reparto fibre tessili vegetali staz. sper. ind. carta e fibre tessili vegetali 31:284-286 (1937); C. A. 31:4109.—Alkali cellulose (10g.) is digested 10 minutes in 100 ml. distilled water and the alpha-cellulose is filtered off; a 100-ml. aliquot of the filtrate and washings is treated with an excess of potassium dichromate in the presence of sulphuric acid; the amount of dichromate consumed in oxidizing the hemicellulose is determined iodemetrically.—C.J.W.

Action of Liquid Ammonia on Cellulose Fibers. Formation of Ammonia Cellulose I, Ammonia Cellulose II and Cellulose. III. Kurt Hess and Josef Gundermann. Ber. 70, no. 8:1788-1799 (Aug 4, 1937); Bull. Inst. Paper Chem. 8:18.—Cellulose with liquid ammonia gives two ammonium cellulose compounds, NH_3-Cell I and NH_3-Cell II, depending upon the temperature. At —20 to —30 deg. they are reversibly changeable into each other. NH_3-Cell II is the more stable form at low temperature and has a fiber period of 15.20 Å, or 3 × 5.07 Å, a trigonal symmetry, and probably a trigonal screw axis. Its probable composition is $C_6H_{10}O_5 \cdot (NH_3)_6$. At higher temperatures, the more stable form, NH_3-Cell I, has a fiber period of 2 × 5.15 Å. Contrary to Barry, Peterson, and King, a reliable indication of their x-ray diagrams cannot be given. It cannot be decided yet whether NH_3-Cell II and NH_3-Cell I are two different modifications with the same chemical composition, or two ammonium compounds with various ammonia contents. On decomposition of these ammonium compounds a new modification of cellulose, Cell III, is obtained. The x-ray diagram of Cell III resembles that of hydrate cellulose and has the same fiber period of 10.3 Å as hydrate and native cellulose. Unlike hydrate cellulose, Cell III on treatment with water at 200 deg. C. changes to native cellulose. Cell III therefore is an unstable modification of native cellulose. In this way a reconversion of hydrate cellulose into native cellulose via Cell III is possible.—C.J.W.

The Heterogeneity of Various Kinds of Cellulose. H. Lachs, J. Kronman and J. Wajs. Kolloid-Z. 79, no. 1:91-102 (April, 1937); Bull. Inst. Paper Chem. 7:369.—Five samples of wood pulp and one sample of bleached linters were acetylated, precipitated in four fractions from acetic acid-acetone mixtures by successive water additions, and then dissolved in chloroform for viscosity measurements. The second fraction of each sample showed the highest viscosity, and the difference between the viscosity of this fraction and that of the last (least viscous) fraction is taken as a measure of heterogeneity. Cellulose from linters appeared least heterogeneous (the difference was 12 per cent of the highest value), while wood pulp fractions differed by 35-80 per cent of the maximum value. Repeated hydrolysis and acetylation did not greatly alter these relations and it is believed that the method gives an approximation of the heterogeneity of the original cellulose. From the fact that wood celluloses show specific viscosities ranging from 1.07 to 1.30, while linters cellulose gives 1.72, acceptance of the Staudinger view leads to the conclusion that acetylcellulose from linters (and the linters themselves) possess a higher average particle size than is found in wood cellulose.—C.J.W.

Highly Polymerized Compounds. 154. (Cellulose. 22). Investigations of cellulose acetates and celluloses. H. Staudinger and G. Daumiller. Ann. 529, no. 3:219-265 (May 25, 1937); Bull. Inst. Paper Chem. 7-371.—Cellulose with a polymerization degree of 1200 yields an insoluble triacetate with about the same degree of polymerization and may be saponified to a cellulose with the original degree of polymerization. Through treatment of cellulose with alkali or acid certain linkages are broken and such products, with a polymerization degree of more than 500, yield soluble triacetates. Mixed esters of cellulose (acetate-propionate, or acetate-butyrate) also are insoluble in organic solvents. A cellulose which has been precipitated from Schweizer reagent and in which the water has been displaced by pyridine, having a polymerization degree of more than 500, yields with acetic anhydride and pyridine a soluble eucolloidal triacetate; such derivatives with a polymerization degree of 1800 or more are reported. These form good films with great strength; their solutions

are very highly viscous and show a marked departure from the Hagen-Poiseuille law. The second part of the paper deals with the determination of K_m of cellulose, cellite and their acetates.—C.J.W.

Highly Polymerized Compounds. 161. The determination of the molecular weight of polysaccharides by the terminal group method. H. Staudinger and E. Husemann. Ber. 70, no. 6:1451-1457 (June 9, 1937); Bull. Inst. Paper Chem. 7:382.—The method of determination of the molecular weight of polysaccharides by determining the terminal groups cannot be used with starch or glycogen, since these polysaccarides have branched chains. With native cellulose the method is uncertain and a negative result as obtained by Hess does not permit any conclusions to be drawn. It is possible that in native cellulose a different sugar group forms the terminal chain member. The method, however, is useful for hydrocelluloses, provided that all the glucosidic linkages in native cellulose are equal. The assumed structural formulas for cellulose, starch, and glycogen are given.—C.J.W.

Highly Polymerized Compounds. 162. Hydrocelluloses. H. Staudinger and M. Sorkin. Ber. 70, no. 7:1565-1577 (July 7, 1937); Bull. Inst. Paper Chem. 8:19.—A study is made of the action of water, boric acid, sodium bisulphite, acetic acid, formic acid, phosphoric acid, sodium bisulphate, sulphuric acid, nitric acid, and hydrochloric acid, at 53 deg. for 1, 6, 24, and 120 hours, on cotton and the effect of such treatment on the physical properties, such as the breaking and tearing strength, and elongation, and the relationship of these properties on the degree of polymerization of the fiber. It is found that the degree of polymerization decreases with the time, and in the order given, and the physical properties of the fiber first begin to decrease slowly at a degree of polymerization of 700-800, while under 600 this decrease occurs rapidly. The strength properties of cotton and of artificial fibers are macromolecular properties and are dependent upon the length of the macromolecules and their arrangement in the fiber. Hemi- and mesocolloidal hemicelluloses, prepared by the action of acid on cotton with a degree of polymerization of 80-470, are soluble in 2.8 *N* sodium hydroxide and 2.5 *N* lithium hydroxide solution. The viscosities of these solutions, which are approximately 10 to 20 per cent higher than those in Schweizer's reagent, show that the state of solution of the hydrocelluloses is the same in all three solvents. The authors conclude that these hydrocelluloses are dissolved as molecules in the hydroxide solutions.—C.J.W.

The Problem of Individual Cellulose Micelles. O. Kraty and H. Mark. Z. phys. Chem. 36B, no. 2:129-139 (June, 1937); Bull. Inst. Paper Chem. 7:408.—In the study of the structure of cellulose the older view of individual micelles is now competing with the theory of connected principal valence chains. X-ray investigations are of no help in distinguishing between the theories. The modulus of elasticity of cellulose favors the newer theory, and the increased orientation of micelles by mechanical means appears to reveal a box-shaped, lattice-like oriented unit cell. Such groups may now be regarded as micelles and require a slight modification of both theories.—C.J.W.

Relation of the Inner Fine Structure of Fibers to Their Mechanical Properties. I. Y. Go and T. Kubo. J. Soc. Chem. Ind. Japan 39:458-462 B (1936).—An x-ray method for the determination of the degree of parallelism of crystallites in fibers is described, and results are given for various fibers. —A.P.-C.

White Oak Holocellulose. Carroll D. Bird and George J. Ritter. J. Am. Chem. Soc. 59:802-803 (May 1937).—The holocellulose (carbohydrate fraction freed of its extraneous materials) of white oak was isolated by alternate treatment with chlorine gas and alcoholpyridine solution. It has physical properties similar to those of holocellulose from maple and spruce, and its substituent groups are distributed similarly to those in maple and spruce; about 20 per cent of the methoxyls and all the carboxyls and the acetyls are located in the white oak holocellulose.

The Constitution of Cellulose. Jean Rolland. Teintex 2:69-72 (1937).—A popularized review of the work of Cross, Bevan, Beadle, Pictet, Fenton, Green, Haworth, Fischer, Tollens, Bertrand, Benoist, Zechmeister and Machemer, illustrated with diagrams, leading to the present concept of the cellulose molecule.—A.P.-C.

The Heat Content of Water Sorbed on Cellulose. J. H. Shipley, W. Boyd Campbell and O. Maass. Can. J. Research 15B:224-228 (1937).—The specific heat of cellulose was determined for the temperature range—70 deg. to 25 deg. C. The heat capacity of water sorbed to the extent of 5.92 per cent and 12.0 per cent by cellulose was determined for the range—78.5 deg. to 25 deg. C. These data are compared with the heat capacity of pure water for the same range of temperature, namely,—78.5 deg. to 25 deg.—A.P.-C.

Adsorption of Metallic Ions By Cellulose: Isoelectric Point of Cellulose. Juliette Gavoret. Compt. Rend. Acad. Sci. 204:1643-1645 (1937).—The adsorption of lead and chlorine ions by cellulose (surgical cotton wool) from dilute solution of lead chloride (0.005 to 0.04 g. per 1.) buffered to a pH of 1.2 to 5.4, was determined. Under no circumstances was any chlorine ion adsorbed, and no lead ion was adsorbed at pH values of less than 2.7. With high pH, adsorption rapidly increases for all concentrations, and also with concentration. Similar results were obtained with other forms of cellulose. They imply that the isoelectric point of cellulose is slightly below pH 2.7.—A.P.-C.

Studies on Fiber Structure: Physical and Chemical Characteristics of Skin Substance or Cementing Material. Friedrich E. Brauns and Harry F. Lewis. Tech. Assoc. Papers 20: 368-370 (June, 1937); Paper Trade J. 105, No. 10: 35-37 (Sept. 2, 1937).—By swelling with strong cuprammonium solution a substance could be isolated from fiber which had all the physical appearance of the membrane surrounding the fiber and which is a copper complex of a carbohydrate material. Hydrolysis breaks down the complex into a blue solution and an insoluble grayish precipitate. After purification of the blue solution by dialysis there was obtained a white powder which contained neither methoxyl nor uronic acids and which was hydrolyzed practically quantitatively to reducing sugars containing neither mannose nor galactose. It would seem that the viscosity of a cellulose cuprammonium solution is due, in part at least, to the viscosity of the cellulose itself in the cuprammonium and that the viscosity value may not always be used in predicting strength when the pulp

being tested has been prepared under conditions which are different from those ordinarily used commercially.—A.P.-C.

Determination of Carboxylic Acid Groups in Oxycelluloses. S. M. Neale and W. A. Stringfellow. Trans. Faraday Soc. 33: 881-889 (1937).—Oxycellulose prepared in neutral or acid solution reduces alkaline copper solution but has little affinity for methylene blue. Oxycellulose prepared in alkaline medium has much less reducing effect on copper solutions and much greater affinity for methylene blue. The degree of absorption of methylene blue depends on pH during preparation of oxycellulose and cannot be taken as an index of the state of oxidation of the material. Oxycellulose shows acid reaction in sodium chloride solution; this indicates that some hydrogen ions of carboxylic acid groups present in oxycellulose are replaced by sodium ions and distribute themselves throughout the two phases in accordance with the principle of membrane equilibrium. To titrate carboxylic acid groups, the material is first washed free of all cations by dilute hydrochloric acid and repeated washing with distilled water till neutral to bromocresol purple indicator. Excess sodium hydroxide is added to a sodium chloride solution in which the oxycellulose is suspended and the solution is titrated back with dilute hydrochloric acid. No heat is applied till near the end point; the sample is then boiled and a current of air free from carbon dioxide is passed through the liquid. Bromocresol purple is used as indicator. In the preparation of oxycellulose there are consumed five oxygen atoms for each carboxylic group produced.—A.P.-C.

Identification of Crystalline Cellulose in Young Cotton Fibers by X-ray Diffraction Analysis. Wayne A. Sisson. Contrib. Boyce Thompson Inst. 8: 389-400 (1937).—Cotton fibers ranging in age from 5 to 50 days were subjected to X-ray diffraction analysis. Samples consisted of fresh and preserved fibers in untreated conditions, after extraction with chloroform and after purification with 1 per cent caustic soda and 2 per cent hypochlorite. Results showed that the age at which cellulose is detected by X-ray analysis depends on history and pretreatment of the sample. since crystalline cellulose was detected at 30 to 35 days in untreated fibers, at 15 to 20 days after extraction, and 5 days in purified fibers. Under favorable experimental conditions, there is good agreement between X-ray and microscopic data at all periods of fiber growth.—A.P.-C.

Change of Temperature of Cellulose by the Sorption of Water Vapor. Sutezo Oguri and Toshio Nakaoka. Waseda Applied Chem. Soc. Bull 32: 1-8 (1937).—Samples showed a maximum temperature in 60 to 90 sec., although the sorption of water at these times was only one-third of the total sorption and the temperature of cellulose was decreased afterward.—A.P.-C.

Application of the Cleavage Type of Oxidation by Periodic Acid to Starch and Cellulose. Ernest L. Jackson and C. S. Hudson. J. Am. Chem. Soc. 59: 2049-2050 (Oct., 1937).—Cornstarch is oxidized rapidly at ordinary temperature by an aqueous solution of periodic acid, apparently quantitatively, with the utilization of one mole of the oxidant per $C_6H_{10}O_5$ unit. Filter paper and cotton cellulose have been oxidized similarly by this reagent, but the amount of oxidant consumed was not as well defined as in the case of cornstarch, probably due to secondary reactions caused by the acidity of the medium during the much slower oxidation of the cellulose. Oxidized starch rotates +9 deg. in water and oxidized cotton rotates —25 deg. in the same solvent. Certain properties which distinguish the oxidation products from starch and cellulose are described.—A.P.-C.

Structure of Cellulose. Harold DeWitt Smith. Ind. Eng. Chem. 29: 1081-1084 (Sept., 1937).—A discussion of present-day knowledge of the composition and structure of cellulose, bringing out more particularly the importance and possibilities of Farr's findings on the formation and structure of the cell wall of cellulose fibers and the presence of a non-cellulosic cementing material of pectic nature.—A.P.-C.

Recent Observations on the Growth and Structure of Vegetable Fibers. K. Hess. Verein Zellstoff u. Papier-Chemiker u.—Ingenieure, Jahresbericht 1936:14-18 (1937); B.I.P.C. 8:54.—Investigations with young cotton fibers show that waxy substances are present to such an extent that they can be detected by X-rays and by isolation. A fiber 15 days of age after extraction with benzene does not give an X-ray pattern (see also Bull. Inst. Paper Chem., 7 no. 5: 142 [January, 1937]).—C.J.W.

Rapid Determination of Alpha-Cellulose. Org. Chem. Ind. (U.S.S.R.) 3:423-425 (1937); C. A. 31: 7639.—The modification of Porvik's volumetric determination of alpha-cellulose is based on the separation from beta- and gamma-celluloses with normal sulphuric acid and the solubility of the alpha-cellulose in 80 per cent sulphuric acid plus acetic acid. By eliminating the necessity of determining the beta- and gamma-celluloses, the alpha-cellulose can be dedetermined in 1-2 hours with an accuracy of ±0.1 per cent. All operations are effected at 20 deg. C. and definite periods of time. Iriturate 2.5 grams of disintegrated sulphite pulp in 20 cc. of 18 per cent potassium hydroxide for 5 minutes, add 50 cc. of the hydroxide solution, shake vigorously for 0.5 minute, let stand and shake again for 0.5 minute (the total time of the alkaline treatment should be exactly 15 minutes). Filter the mixture through a Buchner funnel. If desired, determine the beta- and gamma-celluloses in the filtrate. Wash the alpha-cellulose on the Buchner funnel with suction with normal sulphuric acid, then transfer it to a dry flask, dissolve it in 40 cc. of 80 per cent sulphuric acid containing 100 per cent acetic acid and dilute to 1000 cc. Remove 25 cc. of the solution, add 110 cc. water, 50 cc. of concentrated sulphuric acid and 15 cc. 2 normal potassium dichromate, boil the mixture for 10 minutes, then cool quickly and make up to 250 cc. Withdraw 25 cc. of the solution, add 50 cc. water, 10 cc. normal hydrochloric acid and 20 cc. of 10 per cent potassium iodide and titrate with 0.1 normal sodium thiosulphate. Make a blank test. The difference between these two titrations gives the amount of potassium dichromate required for the oxidation of the alpha-cellulose.—C.J.W.

Viscosity of Cuprammonium Solutions of Cellulose. H. Lachs and A. I. Grosman. Monatsh. 70: 302-317 (1937); C. A. 31:7641.—Viscosity determinations were made of cotton linters and its partial decomposition products in Schweizer solutions of different concentrations. Preparations of different degrees of decomposition were obtained by regeneration from alkali cellulose after different aging periods. In the absence of daylight and oxygen, the

time of flow could be measured accurately within ± 1.5 per cent. The viscosity of the solutions remains constant for several hours. The specific or reduced viscosity in general increases with increasing concentration. This increase is smaller the more the product has been decomposed. This reduced viscosity is independent of the temperature of measurement in the interval 20-24 deg. C. The viscosity decreases considerably with increase in temperature of aging. The specific viscosity decreases with increasing length of aging. The greatest decrease occurs during the first 12 hours. The reduced viscosity bears a linear relation to the concentration in agreement with the findings of Kratky and Saito.—C.J.W.

From the History of Cellulose Research. Karl Freudenberg. Papier-Fabr. 35, no. 27: 247-50 (July 2, 1937).—The article shows how well established the conception was at an early period, of a chain in which the units are linked together by primary valencies. The origin of the question whether one or more sorts of bindings exist are recorded. And finally the part played by the Roentgen optic in the question of the uniformity of the bindings is discussed.—J.F.O.

Concerning the Constitution of Cellulose. H. Staudinger. Papier-Fabr. 35, no. 27: 233-42 (July 2, 1937).—The statement that the colloidal particles in diluted cellulose solutions are macro-molecules and that the physical qualities of cellulose depends on the size and shape of these macro-molecules is proven in this article. There does not exist only one cellulose but a polymeric-homologous series the members of which differ in solid state and in solution by their physical qualities according to the length of the thread molecules. The osmotic and the viscosimetrical methods serve to determine these lengths of chain. Cellulose in fibrous plants and in wood possesses a degree of polymerisation of 2,000; technical cellulose, that is, the rayons have a degree of polymerisation of 300 to 500 according to the method of manufacture. The different behaviour of cellulose, starch and glycogen depends less on the size than on the shape of its macro-molecules. Cellulose is composed by simple thread molecules, starch contains ramified spread out macro-molecules, whereas those of glycogen are spherical.—J.F.O.

Recent Investigations Concerning the Lignin of Various Species of Trees. E. Wedekid. Papier-Fabr. 35 no. 18: 141-42 (April 30, 1937). Investigations were made on the lignin of beech, eucalyptus, cherry and service berry to study its form and to determine if it was similar to spruce lignin. Opinion is divided as to whether each plant has its own lignin or if they all have the formula $C_{41}H_{40}O_{16}$. —J.F.O.

Isolation of Lignin from Bamboo by the Use of Glycerin. Sutezo Oguri and Muneo Takei. Bull. Waseda applied Chem. Soc. 31: 1-9 (1937).—Lignin was most effectively extracted by treating with 25 per cent glycerin at 150 deg. C. for 4 hrs. at pH 9. The methoxy value of lignin thus treated was 13.96 per cent. X-ray photographs of glycerin-lignin indicated that there was no evidence of crystalline structure.—A.P.-C.

Sulphonation of Lignin. Herman Friese and Eberhard Clotofski. Ber. 70. no. 9:1986-1989 (Sept. 8, 1937); B.I.P.C. 8:60.—Further sulphonation of lignosulphonic acid from sulphite waste liquor by means of a sulphuric acid-acetic anhydride-acetic acid mixture and of lignosulphonic acid prepared by the reaction of a sulphuric acid-acetic anhydride-acetic acid mixture on spruce wood by means of calcium bisulphite liquor gives in both cases products of the same chemical composition. Sulphonation experiments with nitrolignin prepared from spruce wood by means of a nitric acid-acetic anhydride-acetic acid mixture with a mixture of sulphuric acid-acetic anhydride-acetic acid, show that no sulphonation takes place. The results lead to the conclusion that lignin is not aromatic in character.—C.J.W.

Delignification of Fir Wood Pulp By Means of Dioxane and the Composition of Natural Lignin. N. I. Nikitin and I. M. Orlova. J. Applied Chem. (U.S.S.R.) 9:2210-2214 (1936);—C. A. 31:4651. Fir pulp was treated on a water bath for 12-22 hours with 8 parts of dioxane in the presence of hydrochloric acid as catalyst (0.12=0.75 per cent of the weight of the dioxane), yielding 16-23.7 per cent (by weight of pulp) of a crude lignin. Lignin prepared from the dioxane solution with ether had the composition C 57-61, H 5.6-6.4 and MeO groups 12.1-13.8 per cent, depending on the amount of catalyst and the duration of the treatment, i.e., it was similar to that obtained by Willstaetter. One-third of the crude lignin was easily dissolved in hot water, yielding a crude lignin of the composition C 64.05, H 5.25 and MeO groups 15.2-15.8 per cent. Further treatment of the lignin with boiling 5 per cent sulphuric acid for 5 hours caused a decrease in weight (4.5 per cent) and increase of the amount of MeO groups to 16.3 per cent. The reducing sugar in an aqueous extract after the hot water treatment and in the hydrolysate after the sulphuric acid treatment was 6-8 per cent of the crude lignin. In addition, the analysis of a crude lignin, after precipitating from dioxane, disclosed 16 per cent of pentosans. The composition of crude lignin was not changed after extracting it from dioxane with ether, but 6 per cent (by weight of pulp) of lignin was not extractable from dioxane with ether. The pulp residue undissolved in the dioxane solution contained lignin 12.2, pentosans 5.3, MeO groups 2.4 per cent (by weight of pulp). The authors believe that lignin exists in the fir pulp as a specific substance which is extractable from dioxane under mild conditions in an uncondensed form which is very similar to the natural lignin.—C.J.W.

Isolation of Lignin from Bamboo By Use of Glycerol. Sutezo Oguri and Muneo Takei. Bull. Waseda Applied Chem. Soc. 31:1-9 (1937); C. A. 31:6458.—Lignin was most effectively extracted by treating with 25 per cent glycerol at 150 deg. C. for 4 hours at pH 9. The methoxyl value of lignin thus treated was 13.96 per cent X-ray photographs of glycerol-lignin indicated that there was no evidence of crystal structure.—C.J.W.

Preparation and Sulphonation of Lignin from Rye Straw and Spruce Wood. V. Hermann Friese. Ber. 70, no. 5:1059-1071 (May 5, 1937); Bull. Inst. Paper Chem. 7:333.—Rye straw and spruce wood meal are decomposed by a mixture of acetic anhydride, acetic acid, and sulphuric acid (7.5:3:1). By means of 80 per cent methanol and ultrafiltration, an attempt was made to separate the various reaction products. Cellobiose acetate is the only identified compound isolated. The lignin is present as a sulphonated product soluble in water. Isolated lignins, such as Klason, Willstätter, and Freudenberg lignin, when treated in the same way give sulphonated lignins insoluble in water.—C.J.W.

Lignin and Lignin Plastics. A Review. Gordon M. Kline. Modern Plastics 14, no. 8:39-41; no. 9:46-47, 74-75 (April, May, 1937); Bull. Inst. Paper Chem. 7:333.—The article reviews briefly the most important conception of the lignin constitution and the preparation of plastics from lignin with phenols, amines and aldehydes.—C.J.W.

Lignin. VII. Nitration and Cleavage of Pine Wood. Hermann Friese and Hans Fuerst. Ber. 70, no. 7:1463-1473 (July 7, 1937); Bull. Inst. Paper Chem. 8:24.—Pine wood is nitrated under various conditions. The best results are obtained with a mixture of acetic anhydride, acetic acid, and nitric acid (360:50:70). The nitrogen content is 12.5 per cent. Apart from an esterification of the hydroxyl groups, a direct nitration of the lignin takes place. The nitropine wood can be saponified with simultaneous cleavage of the wood and is then rendered soluble in water. By means of ultrafiltration a portion of wood substance can be isolated as a highly molecular lignin derivative.—C.J.W.

Lignin. VIII. Preparation and Sulphonation of Lignin from Beech Wood. Hermann Friese and Hanni Glassner. Ber. 70, no. 7:1473-1477 (July 7, 1937); Bull. Inst. Paper Chem. 8:24.—Beech wood is sulphonated by means of sulphuric acid, acetic anhydride, and acetic acid, and the experiment carried out as described in an earlier paper. Eight per cent of the wood remains undissolved; and on further hydrolysis with 10 per cent acid, this product is found to be a lignin-carbohydrate compound.—C.J.W.

Our Present Knowledge of the Chemical Character of the Lignins. Hugo Proboscht. Zentr. Papierind. 55, no. 11:123-126 (June 1, 1937); Bull. Inst. Paper Chem. 7:378.—A brief review is presented of some of the theories of lignin formation and constitution, with special emphasis on the discrepancies of the theories and the comparative lack of positive knowledge.—C.J.W.

The Properties of Bagasse Lignin Extracted By the Dilute Nitric Acid Method. John H. Payne, Edward Fukunaga and Ruth Kojima. J. Am. Chem. Soc. 59: 1210-1213 (July, 1937).—A method for extracting the lignin in bagasse by means of dilute nitric acid is described. The lignin extracted by this method has an apparent molecular weight by the freezing-point method in 1.4-dioxane of 1650±125 and has a composition corresponding to the following approximate formula: $C_{67}H_{54}(NO_2)_2(OCH_3)_8(OH)_4$. Methoxylation and acetylation data confirmed the unreliability of these methods in determining the percentage of hydroxl in the lignin molecule. The absence of carboxyl groups was indicated from electrometric titration curves.—A.P.-C.

Pretreatment of Wood With Hot Dilute Acid: Effect on Lignin Value. Wilby E. Cohen and Elwin E. Harris. Ind. Eng. Chem. (Anal. Ed.) 9: 234-235 (May 15, 1937.)—The influence of pretreatments of wood to remove, by means of hydrolysis, carbohydrate substance which allegedly causes errors in the lignin determination, was studied to determine whether or not lignin is dissolved during such treatments. Hot water to some extent, and boiling 3 per cent sulphuric acid to a much greater extent, dissolved lignin from maple wood. An examination of methoxyl contents demonstrated that the substance removed was lignin and not some carbohydrate material which might polymerize to an insoluble residue. Spruce wood is reported to be effected in a similar manner. It is recommended that all forms of mild hydrolysis, including treatments with hot water, be avoided when preparing woods for either the determination or the isolation of lignin.—A.P.-C.

Lignin Problem. Karl Kurschner. Papier-Fabr. 35: 101-102; No. 14: 115-116 (March 26, April 2, 1937).—Discussion of experiments carried out by nitrating rye straw, producing nitro-lignins. References in the literature and methods of experimentation given in detail.—J.F.O.

Coating

Some Aspects of Starches in the Paper Industry. Irving J. Saxl. Tech. Assoc. Papers 20: 340-346 (June 1937); Paper Trade J. 105, no. 13: 46-52 (Sept. 23, 1937).—The evaluation of the various types of starches and converted starches by methods of fluidity and pH determinations alone does not give representative figures. In selecting starch products for the paper industry they have to be evaluated according to the uses to which they are put. From this requirement two different types of tests became of importance for the behavior of starches as fillers and binders on the one hand and as surface coating materials on the other. The theoretical fundamentals of the above are discussed, practical methods described and illustrations of instruments given, with the aid of which a numerical approach to these problems has been made.—A.P.-C.

Reduction of Dusting in Coated Paper. Paper Patents Co. Brit. pat. 464,292 (April 15, 1937).—To reduce "dusting" in coated papers, the coating mixture of liquid adhesive and insoluble solid is applied to a paper web that has been partially dried by heating, at high viscosity and low temperature so as to avoid separation of the liquid fraction by penetration into the paper.—A.P.-C.

Paper Loop Held Accurately by Photo-Electric Control. W. I. Bendz. Paper Trade J. 105, No. 14: 28-29 (Sept. 30, 1937).—A description of the use of photo-electric cells for holding paper loops in a definite position (e.g., in coating paper or in pasting machines) and of their advantages.—A.P.-C.

Modernized Coating Machine Speeds Production. H. F. Banan. Paper Industry 19: 671-672 (Sept., 1937).—Attention is drawn to the merits of sectionalized electric drive of coating machines as exemplified by the installation in the Lawrence, Mass., mill of Champion International Co.—A.P.-C.

Paper Coating Composition and Process. Clark C. Heritage, assignor to Oxford Paper Co. U.S. pat. 2,089,480 (Aug. 10, 1937).—A compound pigment is precipitated on a filler pigment. More specifically, a white pigment is produced by precipitating calcium sulphate and aluminum hydroxide directly upon the particles of a filler such as clay, suspended in water, and adding thereto an appropriate adhesive such as casein. (Cl. 134-18).—A.P.-C.

Method of Making from Karaya Gum a Gum Deflocculant for Paper Fiber. Thos. R. LeCompte, assignor to John A. Manning Paper Co. U.S. pat. 2,088,479 (July 27, 1937).—Karaya gum is deacetylated by a limited and controlled hydrolysis, and the deacetylated gum is added to paper stock prior to feeding to the paper machine to prevent the formation of fiber clusters. (Cl. 87-2).—A.P.-C.

Stencil Sheet. Otto Schenck and Kurt Stickdorn. U.S. pat. 2,088,764 (Aug. 3, 1937).—The coating

contains a nitrocellulose base plasticized by a vegetable alcohol of high molecular weight such as dodecyl, hexadecyl, octadecyl, ricinoleyl, octodecenol, linoleyl, etc., alcohols, either alone or in combination with one another. (Cl. 41-38.6)—A.P.-C.

Coated Creped Fabric and Article and Process of Making It. Wm. W. Rowe, assignor to The Paper Service Co. U.S. pat. 2,077,438 (April 20, 1937).—A web is coated with a film of cellulosic compounds, lacquer, varnish, etc. After allowing the coating to set to a non-tacky condition, the web is creped. (Cl. 154-33).—A.P.-C.

Removable Adhesive Unit. Arthur B. Mull, assignor to Marathon Paper Mills Co. U.S. pat. 2,080,734 (May 18, 1937).—The invention provides a tab by means of which posters, etc., may be attached to glass, wood, etc., and which may be easily removed without marring the surface. It is produced by applying to paper a pressure sensitive coating which may suitably consist of: rubber 15, "vispronal" 15, amorphous paraffin (melting-point 155 deg. F) 19, ester gum 25, methyl abietate 25, glycerine 0.5, hydroquinone 0.5. (Cl. 24-67).—A.P.-C.

Paper Coating Process. Joseph H. Swan, 3rd, assignor to The Gardner-Richardson Co. U.S. pat. 2,091,572 (Aug. 31, 1937).—After application of the coating to the paper it is smoothed by the successive action of: (1) a roll rotating in a direction opposite to the travel of the paper; (2) one or more brushes; (3) a second roll rotating in a direction opposite to that of the paper. (Cl. 91-18).—A.P.-C.

Vertical Coater. Charles C. Willis, assignor to John Waldron Corp. U.S. pat. 2,094,112 (Sept. 28, 1937).—Paper is coated by passing between a pair of vertical coating rolls, mounted adjustably towards or away from each other. A relatively small uncoated margin is left along the upper edge of the paper web, by means of which the web is handled as it is passed in a vertical position through a drying chamber. (Cl. 91-49).—A.P.-C.

Device for Applying Liquid Adhesive to Paper and Similar Materials. Alfred Winkler and Max Dinnebier. U.S. pat. 2,093,221 (Sept. 14, 1937).—The invention provides special mechanical features in a device for applying liquid adhesive by the so-called stepped layer process, particularly suitable when the adhesive-receiving surfaces of the stepped sheets lie advanced in the direction of their travel. (Cl. 91-43).—A.P.-C.

Machine for and Method of Making Coated Sheet Material. Allen Abrams and Charley L. Wagner, assignors to Marathon Paper Mills Co. U.S. pat. 2,089,524 (Aug. 10, 1937).—The invention provides a machine for coating paper with a rubber-paraffin composition of relatively high viscosity. The paper is passed over a large rubber-covered heated roll above which is a doctor roll. A mass of the coating composition, in a heated plastic condition, is placed on the web in advance of the doctor roll; the latter is adjusted to give the desired thickness of coating, and is rotated in the same direction as, but at a much slower speed than, the lower roll, suitably at a peripheral speed about 4 per cent. to 15 per cent. of that of the large roll. Immediately on leaving the large roll, the coated web is passed around a chilling roll, the coated surface of the paper being in contact with the chilling roll. (Cl. 91-55).—A.P.-C.

Means for Applying Dope to Paper. Chester E. Beecher. U.S. pat. 2,093,347 (Sept. 14, 1937).—Paper is passed over two dope applying rolls before it reaches the driers of the paper machine, so that the dope is applied to the two sides of the paper successively. (Cl. 91-50).—A.P.-C.

Coating Materials

Emulsified Lacquers and Their Applications to Paper. L. Jay Smith. Paper Trade J. 104, No. 25: 22 (June 24, 1937.)—A brief description of the constitution and properties of emulsified lacquer with a discussion of their advantages for coating paper to produce a flexible, adherent and attractive surface.—A.P.-C.

Paper Coatings. Oliver F. Redd. Paper Industry 19: 559-561 (Aug., 1937).—A discussion of the use of the tube mill for grinding calcium carbonate for paper coating, and of its merits.—A.P.-C.

Roll Coating Process. John Traquair. Tech. Assoc. Papers 20, 327-328 (June, 1937); Paper Trade J. 105, No. 5: 45-46 (July 29, 1937).—A description of the development of the roll-coating process by the Mead Corp., Chillicothe, Ohio.—A.P.-C.

A New Type of News Print Paper. W. S. Papeterie 59:725 (Aug. 10, 1937).—Attention is drawn to Carl Winkler's patent for three-ply news print paper, to Consolidated Water Power and Paper Co.'s process for the high-speed two-face coating of paper directly on the paper machine, and to the Millspaugh vacuum forming paper machine for the production of multiple-ply paper.—A.P.-C.

Coated Paper. Paper Patents Co. Brit. pat. 462,754 (March 16, 1937).—In coating paper with a fluid mixture containing in suspension solid particles varying in size, e.g., china clay, an excess flow of the coating mixture is maintained at the point of application of the mixture to the paper, the coarser particles being continuously removed by withdrawing the excess of the mixture at the point of application, treating it to remove coarser particles by sedimentation and returning the residue of such excess to the original stock of coating mixture. An apparatus is described.—A.P.-C.

Coated Paper and Fabrics. Francis C. D. Teague and Detel Products Ltd. Brit. pat. 462,008 (March 1, 1937).—A sheet or strip of textile fabric or paper is impregnated or coated with a composition comprising chlorinated rubber, coumarone resin and tritolyl phosphate dissolved in solvent naphtha. The material is flexible, waterproof, resistant to chemicals, non-inflammable and an electric insulator. It may be used as a covering for jigs, etc., in metal plating and may be rendered adhesive by warming the article to be covered or by applying a solvent, e.g., trichloroethylene.—A.P.-C.

Coated Paper. Erwin Braeuer. Brit. pat. 458,908 (Dec. 29, 1936).—Bookbinding material simulating the appearance of cotton or linen is made by the method described in Brit. pat. 451,152, except that the paper or pasteboard is printed, painted or otherwise processed before being coated so that patterned effects resembling the texture of cotton or linen are obtained.—A.P.-C.

Coating Paper. James D. MacLaurin. Brit. pat. 456, 746 (Nov. 13, 1936).—In a process for equalizing and smoothing the coating on a paper web by a pressure fluid directed against the web, pressure is exerted over the entire width of the web transversely of its direction of travel and at right angles to the plane of the web. The process may be applied to making tinted paper directly on the paper machine.—A.P.-C.

Coated Paper. Diong D. Uong, assignor to Fitchburg Paper Co. Can. pat. 364,481 (March 2, 1937).—A portion of the moisture is removed from the web in a paper machine, a moisture-reactive coating material in dry powdered form is applied to the web after it has left the forming wires, the coating material is allowed to act with the still substantially moist paper web, the web is dried and the previously powdered material is caused to form a relatively smooth surface on the paper before it leaves the machine.—A.P.-C.

Manufacture of Casein Products. Albright & Wilson, Ltd. Brit. pat. 462,114 (July 26, 1935).—The consistency and stability of casein solutions or emulsions intended for use in the paper industries are improved by addition of an alkali metaphosphate.—A.P.-C.

Emulsions for Coating Paper. E. I. du Pont de Nemours and Co. Brit. pat. 458,815 (June 21, 1936).—Emulsions are made with: (a) an aqueous solution of a salt (preferably the acetate) of deacetylated chitin or chondroitin; (b) a water-insoluble material which is liquid at room temperature or (e.g., a wax) at the temperature of emulsification alone or in a liquid solvent, and (c) a wetting agent which is stable to acids (preferably diethylcyclohexylamine lauryl sulphate), with or without (d) a fixing agent (preferably aluminum acetate). Such emulsions are mixed with paper stock for the preparation of sized paper, giving products of improved water resistance. The emulsions are also used for coating fibers and leather, giving durable and water- and weather-resisting coatings. The resistance of the film obtained may be increased by heating, treatment with formaldehyde, acetic anhydride, etc., addition of other waterproofing materials, etc.—A.P.-C.

Means for Applying Adhesive to Materials for Coating Surfaces or in the Manufacture of Coated or Compound Materials. Gabriel Smith. U. S. pat. 2,077,535 (April 20, 1937).—The invention provides a means of applying adhesive in fine hair-like lines to a sheet, so as to unite sheet material to a film or foil. The machine is characterized by an arrangement comprising the combination with at least one pair of superposed pressing rolls, of a reel support for a web of transparent material at a higher level than the pressing rolls, a trough for adhesive at an intermediate level, a pick-up roll in the trough, a patterned roll adapted to apply adhesive directly to the underside of the web or indirectly through a transfer roll, and a roll coated with a thin film of adhesive by the pick-up roll and adapted to coat the patterned roll with a still thinner film of the adhesive. (Cl. 154-35).—A.P.-C.

Pigment Paste for Carbon Papers, Typewriter Ribbons, and Stencil Sheets. Walther Schrauth assignor to "Unichem" Chemikalien Handels A.G. U.S. pat. 2,079,229 (May 4, 1937).—The fats generally used in the preparation of color pastes for carbon paper, etc., are replaced by saturated or unsaturated mono- and poly-hydric high molecular aliphatic or naphthenic alcohols or (preferably) their ethers. Alkali or organic base salts of high-molecular aliphatic or naphthenic alcohol sulphonates are added as dispersing agents. (Cl. 134-1).—A. P.-C.

Coated Paper or Sheet. Allen L. Spafford, assignor of one-half to Wood Conversion Co. U.S. pats. 2,075,835 and 2,075,836 (April 6, 1937).—Sheet material such as heavy paper, cloth, etc., is coated on one side with a waterproofing agent (preferably high-melting asphalt) which resists heat and is flexible with the sheet, and on the other side with another grade of asphalt which becomes adhesive and tacky at a lower temperature than the first-used asphalt. *No. 2,075,835* covers this article and the method of making it, and *No. 2,075,836* an insulating material having this double asphalt-coated sheet as a liner. (Cl. 154-28, 33).—A.P.-C.

Manufacture of Coated Paper. Luther B. Rogers, assignor to Champion-International Co. U.S. pat. 2,080,362 (May 11, 1937).—Small variations in the moisture content of the dried coated paper produces such a variation in the electrical resistance of the coated paper as to enable detection by a suitable instrument, which is suitably connected to increase the speed of the paper if the moisture content is too low and decrease it if the moisture content is too high. (Cl. 91-70).—A.P.-C.

Production of Waxed Paper. Charles H. O'Neil, assignor to Nashua Gummed and Coated Paper Co. U.S. pat. 2,083,273 (June 8, 1837).—A web of paper is led from a supply roll between an upper rubber-covered squeeze roll and a lower steel-surfaced coating roll partly immersed in a wax bath. The waxed paper is passed over a burnishing roll driven against the direction of travel of the paper and then around a roll submerged in water, the arc of contact of the paper around the roll being considerably greater than the submerged arc. Means are provided to leave an uncoated longitudinal zone along one or both edges and for protecting such zone from contact with water. (Cl. 91-55).—A.P.-C.

Wax Coated Paper. Clarence M. Loane and Bernard H. Shoemaker, assignors to Standard Oil Co. U.S. pat. 2,085,373 (June 29, 1937).—Paper is coated with wax having a melting-point of 120 deg. to 145 deg. F. to which is incorporated from 0.5 to 10 per cent of chlorinated paraffin and an aromatic hydrocarbon, resulting in increased gloss and transparency of the waxed paper. (Cl. 91-68).—A. P.-C.

Lacquer Coated Sheet Material and Method of Making the Same. Frederick H. Frost, assignor to S. D. Warren Co. U.S. pat. 2,083,441 (June 8, 1937).—A fibrous or textile base is coated with a mineral coating composition similar to those used for the usual printing or art paper, but containing less adhesive than is necessary in printing papers; the coated paper is dried, calendered and coated with a relatively thin coat of lacquer. (Cl. 91-68).—A.P.-C.

Carbon Paper Duplicator Sheet. Harry H. Schultz. U.S. pat. 2,084,221 (June 15, 1937).—A thin sheet of record paper is permanently secured to the inked surface of a sheet of carbon paper in such a manner that portions of the carbon ink may be forced through the cover sheet when the latter is struck by typewriter type. (Cl. 282-28).—A.P.-C.

Grease Repellent Paper. Carleton Ellis, assignor to Ellis-Foster Co. U.S. pat. 2,086,903 (July 13, 1937).—An emulsion of synthetic resins of the phthalic glyceride type (preferably cottonseed phthalic glyceride resin) is applied to the surface of paper and dried. A laminated grease-repellent sheet may be built up by applying a second sheet to the surface coated with the phthalic resin, repeating until as many plies as desired have been superposed (Cl. 91-70).—A.P.-C.

Coating Apparatus. Colin M. Mackenzie, assignor to Container Corp. of America. U. S. pat. 2,075,620 (March 30, 1937).—The machine comprises a sheet carrying cylinder operating in conjunction with an applicator roll and a doctor roll, and adjustable operating means for maintaining the applicator roll in contact with the sheet carrying cylinder while a sheet is being coated and then moving it out of contact therewith, together with means for effecting a step-by-step movement of the doctor roll while the applicator roll is out of contact with the sheet-carrying cylinder, the doctor roll being capable of adjustment toward and from the applicator roll. (Cl. 91-51).—A.P.-C.

Apparatus for the Manufacture of Coated Paper. Diong D. Uong, assignor to Fitchburg Paper Co. U.S. pat. 2,077,726 (April 20, 1937).—Paper is coated by uniform distribution thereon of finely divided dry powder at a suitable point of the paper machine (preferably at the suction boxes) such that the web still contains sufficient moisture to act with the powder and produce an effective coating. The powder is fed from a hopper, between two adjustable reciprocating grooved plates, into a casing containing two parallel, horizontal, rapidly rotating rolls with knurled surfaces, that distribute the powder uniformly over the surface of the web. (Cl. 91-43).—A. P.-C.

Silicic Acid Ester Colors. Wochbl. Papier Fabr. 68, No. 19: 357-58 (May 8, 1937). The ethyl ester of silicic acid; prepared from ethyl alcohol and silicium tetrachloride, possesses many favorable properties for coating and as a binder.—J.F.O.

Digesting Processes—Miscellaneous

Continuous Pulping Process. Thomas L. Dunbar, assignor to Chemipulp Process Inc. U.S. pat. 2,093,267 (Sept. 14, 1937).—The raw material is fed into a pretreatment tank where it may be subjected to the action of steam and water or other solvent. It is forced upward through a vertical conduit in which the pretreatment is continued and at the top of which is a strainer to remove part of the liquid without relieving the pressure on the material. It is then forced through one or more generally similar units where it is treated with an acid or alkaline cooking liquor. (Cl. 92-7).—A.P.-C.

Method of Digesting Cellulosic Material. Albert D. Merrill. U.S. pat. 2,091,513 (Aug. 31, 1937).—In the process using precirculation of the cooking liquor prior to cooking proper, the charging of the liquor into the digester and precirculation are effected by means of a steam injector until the temperature of the liquor has been raised to the point (about 80 deg. C.) where the injector no longer works efficiently. Precirculation is then continued by means of a suitable pumping system. (Cl. 92-11). —A.P.-C.

Decomposing Cellulosic Substances. Hans Bohynek, Jeimo Hoch and Georg Mayrhofer. Fr. pat. 809,208 (Feb. 26, 1937).—Materials such as wood, preferably practically free from water, are decomposed by hydrofluoric acid at a low temperature, by first extracting as far as possible by a high vacuum the air from the reacting chamber and in the cells of the material, and then allowing the hydrofluoric acid to penetrate the vessel in the absence of diluting gases or vapors. The hydrofluoric may be used in small amount and followed by treatment with dilute mineral acids at a higher temperature. —A.P.-C.

Process for the Decomposition of Fiberous Materials Through the action of High Frequency Electric Fields. A. Uhlmann. Ger. pat. 643,060 (Jan. 19, 1928).—High frequency electric fields in the presence of salts, acids or alkalies is used in a non-conducting container such as ceramics. The direct action of the electric waves on the cells of the fiber causes them to decompose and break off and at the same time fats are removed from the fibre.—J.F.O.

Drying

A Theory of Paper Drying. E. Cowan and B. Cowan. Tech. Assoc. Papers 20:271-277 (June, 1937); Paper Trade J. 105:No. 11, 37-43 (Sept. 9, 1937). Theoretical formulas for predicting the performance of paper-drying machines are developed, and the results obtained by using these formulas are compared with those actually obtained with representative machines. A discussion is given of (1) the drying problems met with in the paper industry and how these problems can be dealt with theoretically in an effort to predict the performance of drying machines, and (2) fundamental equations which can be used in designing and perfecting new equipment.—A. P.-C.

Later Mill Practice in Dewatering and Drying of Pulps. R. D. Kehoe. Paper Trade J. 104, No. 24: 32-39 (June 17, 1937).—A discussion of the later and more modern means of dewatering and drying pulp for shipment, more particularly the Kamyr feltless press and the Flakt drier.—A.P.-C.

Process and Apparatus for Drying Paper. Otto Merckens. Brit. pat. 462,703 (March 15, 1937).—In a machine for producing paper, cardboard, etc., one or more of the drying units have the form of blowing or suction means that travel with the webb for a time during which a current of air is forced through the web.—A. P.-C.

Removal of Vapors from Paper Machines. Papier 40: 575-581 (July, 1937).—A description of the installation at the Grande Couronne mill of the Société Nouvelle de Papeterie.—A.P.-C.

The Influence of Air on Drying. A. E. Montgomery. Paper Trade J. 104, No. 22: 30-31 (June 3, 1937).—A brief discussion of the function of air in drying paper, of the factor determining the effectiveness of air, and of the influence of air on evenness of drying, on drying rate and on steam economy.—A. P.-C.

The Evolution of Sized Paper Drying. Frank W. Partsch. Paper Mill 60, No. 26: 73-74 (June 26, 1937); Paper Trade J. 105, No. 1: 106-107 (July 1, 1937).—The Barbour drier for tub-sized paper is described and its merits are brought out.

Beloit Horizontal Dual Press. T. C. Roberts. Paper Mill 60, No. 3: 16-17 (Jan. 16, 1937).—A discussion of its merits.—A.P.-C.

The Beloit Suction Dual Press Section. V. S. Danison. Paper Mill 60, No. 19: 13, 15, 17 (May 8, 1937).—A description of the press and its operation, with a discussion of its merits.—A.P.-C.

Cleaning and Conditioning Felts. David Blanchard. Paper Trade J. 104, No. 21:22, 24 (May 27, 1937).—A brief discussion of modern felt-cleaning methods, dealing more particularly with the cleaning products put out by the Magnus Chemical Co., Garwood, N. J., and their merits.—A.P.-C.

Automatic Control of Paper Drying. James Strachan. Paper Maker 93: TS65-67 (May, 1937).—

A discussion of the natural moisture content of paper and of attempts to obtain it by automatic control of the drying operation on the paper machine.—A.P.-C.

Electric Heating and Drying Roll. Robert A. Carleton, assignor to National Electric Heating Co., Inc. U. S. pat. 2,074,455 (March 23, 1937).—The apparatus comprises a perforated peripheral surface of conductive material which is heated by the direct passage of electric current therethrough, means being provided for circulating air through the perforations whereby the material is dried, and for recovering waste heat from the vapors given off by the material. By drawing the air through the perforations away from the material being dried, a partial vacuum may be created about the material. Important features of the invention are embodied in the construction of the drum which has its conductive surface so arranged that self-induction is neutralized and is automatically controlled by a thermostat subjected to the temperature of the roll. (Cl. 34-4).—A.P.-C.

Means for Joining the Ends of Drier Felts. Tom Milnes, assignor of one-half to Ayers, Ltd. U.S. pat. 2,077,891 (April 20, 1937).—This is an improvement on Milnes' U.S. pat. 2,077,891 of June 25, 1935. According to the present invention the flat metal strips provided in the earlier patent is replaced by a highly flexible core of metallic or non-metallic material encased in a textile covering. (Cl. 24-33).—A.P.-C.

Paper Making Apparatus. Charles W. Howard, assignor to The Black-Clawson Co. U.S. pat 2,081,456 (May 25, 1937).—An apparatus for removing adhering water from the surface of waxed paper comprising blades which are inclined downwardly and away from a downwardly moving sheet at a small angle to the sheet and at a small angle to the vertical, so that a comparatively small angular change takes place in the direction of movement of the particles of water as they leave the surface of the sheet, in order that the force of gravity be most effectively utilized. (Cl. 91-55).—A.P.-C.

Wet Felted Sheets of Cellulose Fiber. George A. Richter, assignor to Brown Co. U.S. pat. 2,083,744 (June 15, 1937).—Preliberated cellulose fibers such as those of wood pulp are wet-felted at an average fiber length substantially as liberated; the sheet formed is dewatered to dryness while maintaining its fibers in substantially uncemented relation to produce a dried sheet having a compactness ranging from about 20 to 50. The dried sheet is compacted to a compactness of about 70 to 150, and the dry-compacted sheet is comminuted into chips which may then be converted into cellulose derivatives. (Cl. 260-10).—A.P.-C.

Drier Felt. James E. Hooper, assignor to William E. Hooper and Sons Co. U.S. pat. 2,084,490 (June 22, 1937).—The adjacent edges of the felt ends above the clips are formed by folding the felt near the joint back upon itself, the folded edges being placed in close abutting relation completely closing the paper-supporting surface of the felt at the joint. The abutted folds are actually spaced back from the extreme end edges of the felt being joined, and the end portions beyond the first-mentioned folds are turned or folded under or back of the felt. The multiple folds formed in each felt end are secured together by riveting, stapling, sewing, or cementing. (Cl. 24-33).—A. P.-C.

Paper Dryness Control. Stephen A. Staege, assignor to Westinghouse Electric and Manufacturing Co. U.S. pat. 2,085,128 (June 29, 1937).—A drag element is mounted to engage the web of paper at a suitable point (preferably between the last drier and the first calender), and controls electric discharge devices which in turn control a motor operating the valve in the steam header to the driers. (Cl. 34-48).—A.P.-C.

Apparatus for Conditioning or Drying Paper. Hall & Kay, Ltd., H. Kay, S. Hall and A. Myers. Brit. pat. 461,342 (May 9, 1935).—The web is passed between hollow casings from which, at the paper inlet end, jets of air issue, the air being conditioned to give correction to the water in the paper either way. After passing along the paper the air is drawn back into the casing and is caused to pass in the opposite direction in contact with the wall of the casing.—A.P.-C.

Drying Coated Paper. The Assoicated Paper Mills, Ltd., and Richard S. Hendry. Brit. pat. 458,414 (Dec. 18, 1936).—Paper, coated on one surface with enamel, abrasive, etc., is dried by jets of hot air applied to the coated, and of conditioned air to the uncoated surface, all air being withdrawn by suction, such drying preventing curling at the edges of the paper.—A.P.-C.

Means and Method of Drying Coated Paper. Peter J. Massey, William F. Thiele and Bert F. Raprager, assignors of nine-tenths to Consolidated Water Power and Paper Co. U.S. pat. 2,081,945 (June 1, 1937).—Immediately upon leaving the coater the web is subjected to blasts of heating air under pressure to preliminarily set the coating, and is then passed over the initial rolls of a drier while simultaneously directing air blasts between the web and roll surface, entrapping air to form an insulating cushion or film between the coated surface and roll surface. The blasts are so directed with respect to the web that a transverse component of force is exerted on the web in opposite directions, thus placing the web under slight transverse tension sufficient to eliminate "roping" effect. (Cl. 34-24).—A.P.-C.

Dryer for Endless Paper, Carton and Pulp Webs. H. Dillmann, Hersfeld. Ger. pat. 640,572 (June 16, 1933).—The web is partially dried on dryer cylinders and then it goes through a dryer chamber and finally dried on dryer cylinders.—J.F.O.

Coated Paper Drier. Charles C. Willis, assignor to John Waldron Corp. U.S. pat. 2,094,111 (Sept. 28, 1937).—Paper coated on one or both sides is transported through a continuous drying chamber by suspending vertically along one margin. Means are provided for changing the web from a vertical to a horizontal plane before winding. (Cl. 91-55).—A.P.-C.

Steam Drier System. Albert G. Kernin, assignor to Mosinee Paper Mills Co. U.S. pat. 2,094,038 (Sept. 28, 1937).—The condensate drainage lines from the individual driers are provided with members having fixed orifices, which have a maximum capacity for the drainage of condensate but which allow a minimum passage of steam therethrough. When the drier system is in operation, the flow of condensate and excess steam is controlled solely by means of fixed orifices. The excess steam and flash steam from the condensate in the first section is

then condensed in a drier or driers near the wet or dry end as preferred. (Cl. 34-48).—A.P.-C.

Drying Paper. Harry A. Chuse. U. S. pat. 2,091,805 (Aug. 31, 1937).—The sheet is delivered from the forming wire directly around a series of closely perforated rotating cylinders and large volumes of air are forced through the paper, preferably by providing suction boxes inside the cylinders. Paper heating rolls are preferably interposed between the suction drying cylinders. No presses are provided between the wire and the driers, but pressing between a pair of bare rolls may be effected when the sheet has attained a dryness of about 70 to 80 per cent. (Cl. 92-37).—A.P.-C.

Drier Felt. Harold N. Hill. U. S. pat. 2,091,926, (Aug. 31, 1937).—The felt is made of yarn consisting of a core of vegetable fiber (such as cotton) coated or impregnated with a waterproofing composition (suitably rubber latex) around which asbestos fiber is twisted after drying. (Cl. 139-420).—A.P.-C.

Drying Coated Paper and Other Webs. Peter J. Massey and Consolidated Water Power and Paper Co. Brit. pat. 463,291 (March 25, 1937).—A web of paper coated on both faces by rolls that are fed by rolls with the coating mixture, is dried in passing between chests supplied with hot air, etc., and having apertures directed forwardly and outwardly from the center, so as to maintain the web transversely stretched.—A.P.-C.

Arrangement for Conveying Board and Similar Materials Through a Dryer. A. Boleg. Ger. pat. 643,215 (May 28, 1936).—Above the board being conveyed through the dryer is a band, traveling slower or faster than the board, and this band makes for more uniform drying by preventing the formation of air or vapor pockets.—J.F.O.

Device for the De-watering of Mixtures of Fiberous Materials and Liquids. Joh. Wiebe. Ger. pat. 642,845 (Feb. 1, 1935); addition to Ger. pat. 628,110. Elimination of certain deficiencies in the original patent.—J.F.O.

Device for Conveying Sheets of Board and Similar Material Through the Dryer. A. Boleg. Ger. pat. 641,937 (May 28, 1936).—Two bands are used, one for conveying the board and the other above the board to prevent it from blowing away.—J.F.O.

Hanging Dryer for Material in the Form of Sheets, Especially Board. A. Boleg. Ger. pat. 643,514 (Sept. 14, 1935); addition to Ger. pat. 628,917. Method for regulating the passage of the air used for the drying.—J.F.O.

Process for Thickening, that is De-watering Material Containing Fibers. G. Ostersetzer. Aust. pat. 149,130 (Nov. 15, 1936).—The stock passes between two endless wires which are held together by weights and rollers.—J.F.O.

Drying Cylinder Installation for the Drying of Paper or Paper Materials. Ernst Schmit. Aust. pat. 147,039 (May 15, 1936).—Each dryer cylinder is surrounded with a perforated casing.—J.F.O.

Drying Cylinder for Paper and Similar Machines. Maschinenfabrik A.G. vorm. Wagner & Co., Herischdorf. Ger. pat. 643,871 (Nov. 6, 1931).—A better removal of air and a more uniform heating of the cylinder is effected if a special nozzle is provided which shoots live steam in the center in such a way that the vapors within the cylinder are mixed with the incoming.—J.F.O.

Dyeing

A Study of the Retention of Dyestuffs on Paper Making Fibers Under Various Conditions. Ward. D. Harrison. Tech. Assoc. Papers 20: 314-320 (June 1937); Paper Trade J. 105, No. 13: 39-45 (Sept. 23, 1937).—A spectrophotometric method for determining dye retention has been developed which uses Beer's law as its fundamental principle; by the use of this method dye retentions for 20 dyes were determined on the more common pulps under varying conditions of pH, consistency, temperature, time, and freeness. In addition a spectrophotometric method for determining dye retention was developed which uses the Kubelka and Munk equation as its fundamental principle; the results obtained by this method checked with the results of the method using Beer's law, thereby establishing the validity and applicability of this equation. The Freundlich absorption equation was found to represent the retention data.—A.P.-C.

Process of Coloring Paper. Pierre Drewsen, assignor to The Hinde and Dauch Paper Co. U.S. pat. 2,089,949 (Aug. 17, 1937).—In the intaglio coloring of liner board no doctor blade is used on the coloring roll. This produces a colored design on a lighter background of the same color, and prevents accumulation in the ink fountain of dust and impurities on the paper. (Cl. 101-153).—A.P.-C.

Decorative Sheeting and Process of Preparing the Same. Joseph H. Gay, Ralph G. Jackson and John A. Wilson. U.S. pat. 2,092,967 (Sept. 14, 1937).—A non-woven fibrous sheet is decorated throughout its thickness by the application of penetrating coloring matter, and is then split into a number of laminations which are all identically decorated. (Cl. 41-17).—A.P.-C.

Two-Sidedness of Colored Paper. Papier-Ztg. 62, no. 55:911-912 (July 10, 1937); Bull. Ins. Paper Chem. 7:413.—The article describes briefly some of the reasons of two-sidedness in colored paper, such as the dyestuff, fillers, sizing, the wet presses, and calendering. Practical hints for correcting this trouble are given. It is not correct to assume that the wire side is always the darker colored one; in the case of sized paper, it is usually the upper side. The trouble becomes the more noticeable, the thicker the web.—C.J.W.

Manganese Pigments. Agnan Esme. Papeterie 59: 765 (Aug. 25, 1937).—Attention is drawn to the merits of manganese browns and manganese black as pigments for the coloring of paper.—A.P.-C.

Paper Dyes: Victoria Blues. M. Déribéré. Papeterie 59: 661-662 (July 25, 1937).—A brief description of these dyes and of the method of using them for coloring paper.—A.P.-C.

The Function of pH In Coloring Papers. Maurice Déribéré. Papeterie 59: 461-465 (May 25, 1937).—A brief discussion.—A.P.-C.

Paper Dyes: Phenylene and Cresylene Browns. Maurice Déribéré. Papeterie 59:510, 513 (June 10, 1937).—Brief practical hints on the use of these dyes for coloring paper.—A.P.-C.

Colored Paper. E. I. du Pont de Nemours and Co. Brit. 458,819 (Dec. 21, 1936).—This is an addition to Brit. pat. 458,813. Colored paper, fast to water, is made by applying to surface-colored paper an aqueous solution of deacetylated chitin or de-

acetylated chondroitin, which may be prepared as in the main patent.—A.P.-C.

Treating Surface-Colored Paper. Herbert A. Lubs, John R. Roberts and Edwin R. Laughlin, assignors to E. I. du Pont Nemours & Co. U. S. pat. 2,085,163 (June 29, 1937).—Paper that is surface-colored with a water-soluble dye, preferably an acid or direct dye, is subjected to an after-treatment with an aqueous solution of deactylated chitin. (Cl. 8.5). —A.P.-C.

Treating Cellulosic Materials. I. G. Farbenindustrie A. G. Brit. pat. 462,290 (Feb. 25, 1937).—Cellulosic materials are improved, especially as regards their dyeing properties, by treating them, preferably in an aqueous medium, with substantially colorless organic compounds containing: (a) at least one group that renders the compounds substantive e.g., the residue of benzidine and its derivatives, of hydroxynaphthoic acids, of acetoacetic acid naphtylamides, of 4, 4′-diaminodiphenylurea and its derivatives, of 4, 4′-diaminostilbene of 4, 4′-or 5, 5′ —diaminocarbazole, of benzidinesulphone, of 1, 4-phenylenediamine, and of 1, 5-naphthylenediamine and residues of aminobenzoic or aminocinnamic acids linked together in an amide-like manner, (b) at least one aliphatic, cycloaliphatic, aliphatic-aromatic or heterocylic radical with at least seven carbon atoms directly attached to one another, and (c) at least one quaternary ammonium or phosphonium or ternary sulphinium group not directly attached to an aromatic nucleus.—A.P.-C.

Coloring of Paper. A. G. Bloxam assignee of Society for Chemical Industry in Basle. Brit. pat. 461,042 (Jan. 30, 1936).—The application of ice colors to paper with elimination of drying after grounding with the arylamide component is claimed: e.g., paper is colored deep yellow by passage successively through baths of alkaline diacetoacet-orthotolidide and diazotized ortho-chloroaniline.—A. P.-C.

Electricity in Paper

Static Electricity in Paper Manufacture. James Strachan. Paper Maker 93: TS81-82 (June, 1937). —Static electricity is not generated when two dry paper surfaces are rubbed together. When two sheets of paper are pressed into intimate contact under a pressure of 100 to 120 lb. per sq. in. and then separated, the two surfaces that have been in contact are charged electrically, one positively and the other negatively. When dry paper is rubbed or pressed into contact with another material, such as metal, the paper surface acquires a single charge, generally negative. On the dry end of the paper machine static electricity is produced not so much by friction of the dry paper surface on metal as by close contact of paper and metal under pressure. When several layers of dry paper are pressed together, opposing positive and negative charges appear when the sheets are separated.—A.P.-C.

Static Electricity in Paper. Anon. Papier 40: 493-499 (June, 1937).—A discussion of the causes and remedies of static electricity in paper.—A.P.-C.

Static Electricity in Paper. Technologie de l'imprimerie 5, No. 44: 1113-1116 (March, 1937).—A general review of the present knowledge of static electricity in paper is given, discussing the reasons for and nature of static electricity, its formation on the paper machine and printing presses, and known methods for eliminating or minimizing the trouble.—C.J.W.

Fillers

Some Colloid Chemical Aspects of Clay as a Loading Material. E. A. Hauser, Tech. Assoc. Papers 20: 360-362 (June, 1937); Paper Trade J. 105, No. 7: 39-41 (Aug. 12, 1937).—A discussion of the colloidal aspects of clays with particular consideration of particle size and shape and base-exchange phenomena.—A.P.-C.

Nature of China Clays. Wm. W. Meyer. Tech. Assoc. Papers 20:376-378 (June, 1937); Paper Trade J. 105, No. 11:35-36 (Sept. 9, 1937).—A brief explanation and discussion.—A.P.-C.

The Sveen Method for Increasing the Retention of Fillers and Fibers. P. M. Loddengaard. Tech. Assoc. Papers 20: 291-296 (June, 1937): Paper Trade J. 105, No. 9: 37-42 (Aug. 26, 1937).—The method consists essentially in adding to the stuff some 30 to 60 sec. before it reaches the apron a 1 per cent solution of bone or hide glue solution which has been allowed to mature at low temperature, after correction of the pH by alum. The merits and performance of the method are discussed.—A.P.-C.

Manufacture of Paper Containing Alkaline Filler. Harold R. Rafton, assignor to Raffold Process Corp. U. S. pat 2,077,436 (April 20, 1937).—The alkaline filler is added to the stock, prior to delivery to the paper machine, in the form of a dry mixture with size and acidic material, the filler being present substantially in excess of the chemical equivalent of the acidic material. (Cl. 92-40).—A. P.-C.

Manufacture of Loaded Paper. Arthur M. Brooks, assignor to Raffold Process Corp. U. S. pat. 2,077,393 (April 20, 1937).—Paper of high opacity and whiteness is obtained by the utilization of a substantially water-insoluble oxalate as a filler. (Cl. 92-21).—A.P.-C.

Filled Paper. Harold R. Rafton, assignor to Raffold Process Corp. U.S. pat. 2,080,437 (May 18, 1937).—Paper containing an alkaline filler is surface-treated with a water-soluble salt of a metal that reacts with the alkaline filler, forming an insoluble compound of high opacity. (Cl. 92-40).—A.P.-C.

Machine for the Manufacture of Paper. Albert E. H. Fair, assignor to Economy Filler Processes, Inc. U. S. pat. 2,079,846 (May 11, 1937).—A suspension of filler is delivered by means of sprays directly onto the top of the moist sheet on the fourdrinier wire. The sprays may be directed against a baffle from which the filler suspension flows evenly onto the sheet. The downwardly sloping front of the flow-box lip may be used as baffle. (Cl. 92-40). —A.P.-C.

Paper Manufacture. Harold R. Rafton, assignor to Raffold Process Corp. U.S. pat. 2,084,358 (June 22, 1937).—Paper containing an alkaline filler is treated with a water-insoluble organic liquid (such as liquid petrolatum, rosin oil, pine oil, fatty oils, etc.) in a volatile solvent, and the solvent is removed. (Cl. 91-68).—A.P.-C.

Fillers Treated by the Micronizer Process. Papir-J. 24, no 23:292, 294 (Dec. 15, 1936); Bull. Inst. Paper Chem. 7:383.—Brief reference is made to a process of comminuting fillers to fine colloidal

particles, the so-called "Micronizer process." The products treated in this manner exhibit a very uniform particle size and are specially suited as paper fillers, increasing size resistance and opacity, and giving excellent printing surfaces.—C.J.W.

Changeable Action Between the Filler Content of the Paper and Its Technological Properties. 11. The Influence of the Filler Content on the Properties of the Paper. W. Brecht and H. Pfretzschner. Papier Fabr. 35, No. 10:73-80; No. 11:85-92; No. 12:96-100; No. 13:103-07 (March 5-26, 1937).—The following topics are discussed in detail: No. 1, the filler content in its relation to the rubbing in the stock suspension, in pipes, moment of rotation of stock agitation, the flow of stock in beaters, stock density regulation; No. 2, the filler in its relation to the de-watering ability and the speed of drying of the paper stock; No. 3, the influence of the filler content on the properties of the paper, method of carrying out the experiments, the filler content and the basis weight, the sheet thickness, the apparent and the actual density of the sheet, the porosity of the sheet, the softness of the paper (compressibility), the calendering of the paper; No. 4, the filler content and the optical properties of white paper, whiteness of the filler and the whiteness of the paper, the opacity of filled papers; No. 5, the influence of loading on the efficiency of the paper sizing, influence of filler content, influence of type of filler; No. 6, the influence of loading on the moisture content of the paper. Numerous curves accompany the article.—J.F.O.

Machinery

Digester Blades of Aluminum Bronze. F. Ostermann. Z. Metallkunde 29: 67 (1937); C. A. 31:6000.—Knives for paper pulp digesters were made of an aluminum bronze with about 9 per cent aluminum and compared with the usual phosphor bronze material. The aluminum bronze showed a higher corrosion resistance in hot and cold 5 per cent sulphuric acid and also better strength and hardness properties.—C.J.W.

Lining of Wood-Steaming Vessels with Exchange-Saving Materials. F. Hoyer. Korrosion u. Metallschutz 13:91-93 (1937); C. A. 31:6878.—The lining with masonry and other non-metallic materials and the use of metal-clad plates are discussed.—C.J.W.

Technical Developments in the Paper Industry. A. Basberg. Papir-J. 25, no. 8:122-126, 128, 130-132 (April 30, 1937).—An illustrated review is given of recent developments in paper making machinery.—C.J.W.

New Continuously Working Pulp Disintegrator. A. Foulon. Chem. Apparatus 24, no. 11:180-181 (June 10, 1937); Bull. Inst. Paper Chem. 7:421.—A brief description of a new type of pulp disintegrator is given which the German firm Eirich has placed on the market. It can be used for broke, pulp, or waste paper, works continuously, and consists of a chopping unit and the actual disintegrator with steam washing equipment. The material can be disintegrated to different grades of fineness; it is uniform and contains neither splinters nor knots. The equipment is constructed in various sizes; power consumption is claimed to be low.—C.J.W.

Refining of Groundwood Tailings. Zentr. Papierind. 55, no. 13: 147-148 (July 1, 1937); Bull. Inst. Paper Chem. 7:421.—Brief reference is made to the European method of refining between a stationary and revolving stone, the American method between two steel discs revolving in opposite directions (Miami rotary refiner), and the Haug refiner. The latter is described more in detail.—C.J.W.

New Developments in the Wood Pulp Industry. Eigil Kreutz. Papir-J. 25, no. 8:132-134, 136-141 (April 30, 1937); Bull. Inst. Paper Chem. 7:401.—A review is given of recent developments in the woodroom and groundwood mill, including refiners for groundwood tailings.—C.J.W.

Kamyr Pressure Filter. Indian Print and Paper 2, no. 4:22-23 (June, 1937).—A brief illustrated description of the Kamyr filter for thickening pulp.—C.J.W.

British Precision Slitting and Rewinding Machines. British Paper 5, no. 1:38, 40, 42, 44 (Empire issue, 1937); Bull. Inst. Paper Chem. 7:337.—An illustrated description is given of the precision slitting and rewinding machines, manufactured by the British firm C. A. Harnden, Ltd., of Hyde.—C.J.W.

Cutting Systems of Slitters. Papier-Ztg. 62, no. 62:1026 (Aug. 4, 1937); Bull. Inst. Paper Chem. 8:27.—In this article, the principle of the two main cutting systems employed in slitters, is described. The one method uses one circular knife which in cutting is pressed against a roll which exerts a pressure against the cutting surface; the second method employs two circular knives, and the paper web is led between the upper and lower slitters.—C.J.W.

Few Methods for the Longitudinal Creping of Paper. Papier-Ztg. 62, no. 38:648-649; no. 39/40: 668, 670-671 (May 12, 15, 1937).—Several recently patented methods are discussed.—C.J.W.

Recovery of Fibers by Flotation. Bjoern Sucksdorff. Finnish Paper and Timber J. 19, no. 10:475-476, 478-480, 482 (May 31, 1937); Bull. Inst. Paper Chem. 7:380.—Fiber recovery by flotation is obtained by adding a flocculation agent to the waste water and mixing it with air, which causes the fibers to rise to the surface from where they can be readily removed. The author worked with Sveen-Pedersen and Adka installations and found the Sveen glue in both cases the most effective flocculation agent, even for the Adka save-all for which certain chemicals are prescribed. Care must be taken that the correct quantity is added, because too much glue is just as harmful as too little glue. The air supply must be suitably regulated. Large air bubbles impair flocculation, while insufficient air reduces the efficiency of the installation. The water from the suction box and suction rolls should not be included in the system. Cellulose fibers are easy to recover while the coarsest and finest fractions of groundwood pulp cause difficulties. Ordinary clay does not affect the system. The fiber-water ratio should lie between 200-1500 mg. per liter. As compared with sedimentation systems, the flotation method offers the advantages of lower first installation, higher efficiency, less floor space, better possibilities of control, changes from one furnish to another even where strong color contrasts are involved can be made rapidly, the places where slime accumulates are few, and the entire system can easily be washed up every Sunday. Operating expenses are equal for sedimentation and flotation.

Slitting Machine. Gerald Strecker and Theodor Göckel. U.S. pat. 2,085,835 (July 6, 1937).—Both knives of each coating pair of cutters are fitted to a

common holder which is displaceable across the width of the paper. The holders are connected by or integral with a bent or curved member located behind the cutters in the direction of travel of the paper and passing through the slit produced in the web by the knives; it is so shaped that the two adjacent strips which slide along it are bent out of the plane in which the web is fed to the cutters. (Cl. 164-60).—A.P.-C.

Pulp-Agitating Apparatus. John A. Rosmait. Can. pat. 366,868 (June 15, 1937).—Pulp stock in a storage chest is agitated by pumping from a low part of the chest and refeeding it at a higher part. Additional pulp is delivered to the system prior to the refeeding of the stock into the chest. An apparatus is described.—A.P.-C.

Machine for the Continuous Refining of Pulp. J. M. Voith Co. Fr. pat. 807,278.—In a conical refiner in which pulp is fed at one end and passed repeatedly around and finally discharged at the other end, pulps of different degrees of hardness can be treated simultaneously by feeding them at various points according to their hardness.—A. P.-C.

Cylinder Paper Machine. Earl E. Berry, assignor to Beloit Iron Works. U.S. pats. 2,083,817 to 2,083,819 (June 15, 1937).—*No. 2,083,817*—A combination suction drum and press roll is mounted after the last cylinder mold, and the pick-up felt is trained around the suction roll and passes between the nip of the press roll and suction roll. *No. 2,083,818*—A suction roll is used for extracting water through the pick-up felt and web thereon, and the degree of water extraction is increased by mounting a press roll above the suction area of the suction roll. *No. 2,083,819*—The cylinder molds rotate toward the drier section, and the use of primary press rolls, extractor rolls, etc., is dispensed with. The pick-up felt is trained around a water-extracting device acting through the felt to withdraw water from the web without crushing it. The web is immediately removed from the pick-up felt and carried by another felt with the surface that was exposed on the pick-up felt contacting the new felt. (Cl. 92-38; 92-43).—A.P.-C.

Method and Apparatus for Joining Wire Cloth. William E. Buchanan, assignor to Appleton Wire Works, Inc. U.S. pat. 2,078,369 (April 27, 1937).—The apparatus covered by this patent comprises a carriage which travels along the adjacent end portions of the cloth for bringing the cloth edges into abutment. The carriage supports heating means for the joint and also has means for guiding a strand to be interposed between the cloth edges. Means are provided for effectively clamping the cloth, for guiding the carriages, and for bringing into register the selvage edges of the cloth at the finishing end of the joint and for avoiding waviness at the joint. (Cl. 140-3).—A.P.-C.

Oscillating Mechanism for Wire Shaking Mechanism. Klemens Lurz and Karl Schönemann. U.S. pat. 2,078,715 (April 27, 1937).—The mechanism comprises a pair of wheels or discs forming gyrating masses rotating in equal sense and having a common center of gravity. The wheels or discs carrying the gyrating masses are mounted on a hollow shaft and a spindle formed with a high pitch threading is arranged for axial movement within this shaft for turning the loose wheel or disc relative to the wheel or disc fixed on the shaft, thus adjusting the relative angular position of the two masses. (Cl. 74-61).—A.P.-C.

Paper Machine. W. Boyd Campbell, assignor to Harold J. Rowley, U. S. pat. 2,077,614 (April 20, 1937).—A rotatable, wire-covered, web-forming drum is formed with continuous shallow compartments disposed around the periphery immediately under the wire covering. At each end of each compartment is a chamber communicating with and extending radially further than the compartment. One or more suction headers are provided to communicate with the chamber by means of an opening located in the outer wall of each chamber at a radial distance from the axis of the drum greater than that of the wire covering. (Cl. 92-43).—A.P.-C.

Feeding Mechanism for Fibrous Layers. Sidney L. Schwarz, assignor to Cellufoam Corp. U.S. pat. 2,067,350 (Jan. 12, 1937).—In the manufacture of layers of cellulose fibers which have been distended by the use of a liquid solution including a foaming agent such as saponin, an air blast is used beneath the fibrous layer to raise it slightly and carry it over without sagging, on to a suitable transfer belt. (Cl. 92-38).—A.P.-C.

Press Roll Drive. John W. Vedder and Charles E. Robinson, assignors to Rice, Barton and Fales, Inc. U.S. pat. 2,067,360 (Jan. 12, 1937).—The bottom roll is positively driven by known means, and the top roll is positively driven by a motor that is energized by a potential proportional to the speed of the bottom roll, so that the speed of the top roll has a definite relation to the speed of the bottom roll. (Cl. 92-47).—A.P.-C.

Doctor for Paper Machines. Frederick W. Vickery. U.S. pat. 2,077,816 (April 20, 1937).—The doctor blade is prevented from being dislodged from the holder even under excessive working pressure by making a part of the holder movable from the end, so that lateral withdrawal of the blade is impossible unless it is freed by the operator. (Cl. 92-74).—A.P.-C.

Shake Mechanism for Paper Machine Table. F. H. J. B. Goreux, L. J. A. Spinhayer and J. V. G. M. Antoine. Fr. pat. 807,142.Two or more small rolls are mounted to rotate freely on spindles or pins fixed in a rotating plate. A belt passes around a pulley rigidly connected to the portion of the table to be shaken, passes in contact with the rolls on the rotatable plate, and is attached at both ends to support mounted on a rod provided with right and left hand threads so that the distance between the two ends of the belt may be adjusted. Suitable springs act on the opposite side of the paper machine table. The amplitude and frequency of the shake can be modified by suitably adjusting the speed of rotation of the plate, distance between the ends of the belt, position of the pulley connected to the table, and tension of the springs; these adjustments can be made while the machine is running.—A.P.-C.

The Beloit Suction Dual Press Section. V. S. Denison. Pulp Paper Mag. Can. 48: 553-555 (July, 1937).—A description of the press and a discussion of its merits.—A.P.-C.

Pulping Method. Charles D. Altick, Lloyd D. Smiley and Edward T. Turner, assignors to Pulp Process and Development, Inc. U.S. pat. 2,078,222 (April 27, 1937).—The digester is filled full of fibrous raw material and the level of the cooking liq-

uor is raised above that of the digester dome so that there is no space or low pressure area into which gases may rise within the digester. To insure intimate mixture of the material and cooking liquor during the digestion, material intermixed with liquor is positively circulated through the digester by being withdrawn at one end and reintroduced under pressure at the other in a more or less continuous cycle of circulation. A portion of the cooking liquor is also circulated through the cooking mass under pressure additionally to such circulation of the liquor and chips by being withdrawn from the digester and reintroduced under pressure and in a reheated condition, either at the bottom or at any suitable elevation. After withdrawal from the tank the pressure on the cooking liquor is temporarily reduced, and the entrained gases are collected, condensed and returned to the liquor. Prior to introduction into the digester the material is subjected to a soaking treatment with the cooking liquor. The periods of circulation of the intermixture of chips and liquor and that of the liquor alone are automatically controlled by suitable power switching means, either on a time basis or by volume control, in which case a fluid meter is introduced into the circulatory cycle. (Cl. 92-7).—A. P.-C.

Digesters. Edmondson Spencer and Frederick S. Mitchell. Brit. pat. 457,891 (Dec. 8, 1936).—In a digester of the Sinclair type having a perforated inner bottom, an upper valve casing in the form of a dome or cone or with conical projections above this bottom has discharge openings for digested pulp, and a lower cylindrical valve casing between the inner bottom and a discharge opening for the pulp in the bottom of the digester has openings for liquor circulation; a rotatable valve with a cylindrical extension apertured in the valve casings opens one set of openings and closes the other.—A.P.-C.

Perforated Inner Bottom Plates of Digesters. E. Spencer and F. S. Mitchell. Brit. pat. 458,863 (July 15, 1935).—The bottom is formed with radial V-shaped corrugations of angle approximately 60 deg. and inclined so that even the valleys slope towards the center, at which point is an acutely conical discharge device.—A.P.-C.

Refining Engines. The Noble and Wood Machine Co. Brit. pat. 458,919 (Dec. 28, 1936).—The present patent covers more specifically the transverse grooves on the periphery of the rotor of the machine described in Brit. pat. 457,654.—A.P.-C.

Paper Machine Roll. Robert J. Wilkie, assignor to Stowe-Woodward, Inc. U.S. pat. 2,066,755 (Jan. 5, 1937).—Rigidity and light weight of rapidly rotating, small diameter rolls is obtained by providing stiffening webs or ribs, preferably extending axially of the roll and forming pockets to receive portions of the rubber covering when one is used. A head is inserted in the ribbed roll, and an inwardly-extending portion of the rubber covering covers and protects the end of the tube. (Cl. 93-44).—A.P.-C.

Paper Break Detector. Pieter Juchter, assignor to General Electric Co. U.S. pat. 2,078,800 (April 27, 1937).—In an apparatus using photoelectric means for detecting a break in the paper on a printing press, the photoelectric device, and preferably also the light source, are protected from the material which may collect thereon by means of an enclosing casing having a window which is so arranged with reference to the paper that the latter wipes across it and keeps it clean. (Cl. 192-127).—A.P.-C.

Screening Device. Harold R. Rafton, assignor to Rafton Engineering Corp. U.S. pat. 2,066,364 (Jan. 5, 1937).—The invention relates to gyratory screens for slurries containing paper pigment. The machine has a pan having a bottom opening and a substantially cylindrical side wall. A screening element is secured against the bottom opening and the pan is provided in its side wall with a discharge opening arranged wholly above the level of the screening element. The pan is completely covered with a top having an inlet spout which communicates with the pan at a point substantially diametrically opposite to the bottom discharge opening. A perforated spreader plate having a concave upper surface is arranged beneath the inlet spout and inclined downwardly toward the center of the pan. (Cl. 209-269).—A.P.-C.

Tube Roll Mechanism for Paper Machines. William C. Nash, assignor of one-fifth to Mary Jones, one-fifth to William M. Nash, one-fifth to Roy A. Nash, and one-fifth to Marie D. Nash. U.S. pats. 2,083,341 and 2,083,342 (June 8, 1937).—The invention provides means for decreasing the rate of rotation of the tube rolls, particularly those adjacent the head box. This is effected by an arrangement whereby the axes of the tube rolls are moved at a desired rectilinear speed in the direction of travel of the machine wire. *No 2,083,342* more specifically provides an endlessly moving articulated conveyor upon which the tube rolls are mounted in such a way that they may be moved periodically to position under the machine wire without jarring or shaking the latter. (Cl. 92-44).—A.P.-C.

Doctor Blade. James R. Burgess, assignor to Canadian Wallpaper Manufacturers, Ltd. U.S. pat. 2,081,320 (May 25, 1937).—In a doctor blade used in connection with wall paper printing apparatus, the scraper element is formed of glass, which is preferably supported between plies of rubber or other suitable resilient material, which in turn are positioned between steel retainers.—A.P.-C.

Screen Plate. Ralph E. Cleveland. U. S. pat. 2,086,087 (July 6, 1937).—In order to obtain a sufficiently heavy chromium plating on the inside faces of the screen slots, half the depth (or more) of at least every alternate rib between the grooves on the underside of the screen plate are removed. (Cl. 92-31).—A.P.-C.

Wet Presses of Paper Machines. William H. Millspaugh. Brit. pat 457,858 (Dec. 4, 1936).—At least one roll of the wet press has a suction zone open to the air on the inlet side of the press so as to withdraw water expressed at the bite.—A.P.-C.

Press Roll for Paper Machines. Ralph E. Cleveland, assignor to Chromium Corp. of America. Can. pat. 364,946 (March 23, 1937).—The surface of a metal roll is sand-blasted so that indentations are produced of sufficient porosity to prevent picking up paper fibers but too small to leave an imprint on paper, and the surface is lightly coated with chromium without substantially decreasing its porosity. —A.P.-C.

Wire Fabric for Paper Machines. Eastwood-Nealley Corp. Brit. pat. 458,363 (Dec. 14, 1936).—The fabric is woven from flat ribbon-like warp wires and circular section weft wires, the weft and warp knuckles being substantially coplanar.—A.P.-C.

Fourdrinier Paper Machine. Beloit Iron Works. Brit. pat. 457,632 (Dec. 2, 1936).—The table rolls have supports over the greater part of their length,

e.g., shells open at the top, which extend under and partly around the rolls.—A.P.-C.

Use of a Double-Wire Paper Machine for the Production of Board Having Special Properties. H. L. G. Muller. Belg. pat. 418,258 (Dec. 31, 1936).—In a paper machine having two superposed wires, the return stretch of the upper wire has a horizontal portion above which is mounted a flow box.—A.P.-C.

Wet Presses of Paper Machines. William H. Millspaugh. Brit. pats. 458,756, 458,758, 458,759 and 458,760 (Dec. 21, 1936).—*No. 458,756*—In a wet press comprising two co-acting suction rolls and a plain roll above and co-acting with the upper suction roll, the latter has a yielding perforated rubber surface. *No. 458,758*—The wet web on a cylinder or fourdrinier paper machine is transferred by a displaceable suction roll in advance of the axis of the couch roll from the endless wire to the press felt of a wet press comprising one or more suction rolls and one or more plain rolls beyond and spaced from the couch roll, transfer roll and upper part of the wire. *No. 458,759*—A wet web of pulp in a Yankee or M.G. paper machine is transferred from the wire to a press felt and passes with it and a second press felt through the bites of superposed wet press rolls, the web being subjected at each bite simultaneously to pressure and suction, suction boxes applying suction in opposite directions through the web to draw expressed water and air through it, the web being then delivered to the drier press roll and drum. *No. 458,760*—A wet press beyond the couch roll in a fourdrinier or cylinder machine comprises an upper plain roll acting on the wire side of the web and a lower suction roll having a suction transfer box and a water-withdrawing box, a felt receiving the pulp web as it passes between a part of the wire and lower suction roll and conveying it about this roll and through the press.—A.P.-C.

Consistency Regulation of Pulp for the Manufacture of Paper. W. Voith, H. Voith and H. Voith. Brit. pat. 458,978 (March 23, 1936.—The consistency of dilute stock (about 1 per cent) is regulated by concentrating to about 3 per cent by withdrawal of a constant quantity of water, the stock being then passed to a consistency regulator (of any known automatic design) and diluted as required. The water withdrawal is through a perforated revolving filter drum containing scoops inside.—A.P.-C.

Washing Paper. David Russell. Brit. pat. 458,-366 (Dec. 15, 1936).—Paper is washed during manufacture by spraying the dandy roll or the web adjacent thereto and, if desired, also the couch and press rolls with water free from salts in solution, e.g., distilled water, which is withdrawn by a suction box. —A.P.-C .

Refining Engines for Paper Pulp. The Noble and Wood Machine Co. Brit. pats. 457,654, 457,701 and 457,702 (Nov. 30, 1936).—*No. 457,654*—In a refining engine, where paper pulp is ground between the periphery of a rotor and adjustable radial stator units or bed plates supported on the rotor casing and extending circumferentially between a feed chamber that receives pulp under pressure and a discharge chamber, both chambers being peripheral of the rotor, the bed plates are moved independently towards and away from the rotor to form a substantially continuous treatment zone of variable length according to the number of units in use. *No. 457,701* provides means for regulation of the grinding pressure responsive to pressure variations in the feed chamber. *No. 457,702* provides means for accumulating large particles, etc., on the inlet side of the treatment zone and their discharge through a trash outlet and valve.—A.P.-C.

Humidifying Paper. Anon. World's Paper Trade Rev. 107: 517 (Feb. 12, 1937).—A brief description of the Orion patent fogging and damping machine, the unique feature of which is that the feeding of the air and water is effected separately, and either can be regulated independently of the other.—A.P.-C.

Modern Mechanical Drives for Paper Machines. Robert L. Wickes. Paper Trade J. 105, No. 1: 122-124 (July 1, 1937).—A description of some recent developments.—A.P.-C.

Development of the Fourdrinier. H. G. McDowell. Paper Trade J. 105, No. 1: 80-86 (July 1, 1937).—A.P.C.

Consistency Regulator. Papeteries Navarre. Fr. pat. 810,269 (Dec. 5, 1935).—A propeller blade is rotated in the stock, being driven by one of the shafts of a planetary differential the other shaft of which is held stationary by a lever or spring. Variation in the consistency of the stock changes the power required to drive the propeller blade thereby changing the position of the differential which is made to operate the valve in the dilution-water line to reduce or increase the amount of dilution water so as to correct the variation and keep the consistency constant.—A.P.-C.

Stock Consistency. Anon. World's Paper Trade Rev. 107: 195-196 (Jan. 15, 1937).—A brief description of the main features of the Sall consistency regulator.—A.P.-C.

The Crowning of Couch and Wet Press Rolls. Anon. Pulp Paper Mag. Can. 38: 417-418, 458 (May, 1937).—A brief discussion of some practical points.—A.P.-C.

Improvements Incorporated in the Latest and Largest Fourdrinier Kraft Liner Board Machine. R. S. Johnston. Paper Mill 60, No. 26: 107-116 (June 26, 1937); Paper Trade J. 105, No. 1: 93-96 (July 1, 1937).—A description of the 400-ton, 242-inch machine just installed at the new Charleston, S. C., plant of West Virginia Pulp and Paper Co. —A.P.-C.

Riffling of Groundwood Pulp. R. I. Wynne Roberts. Paper Mill 60, No. 26: 65-70 (June 26, 1937); Paper Trade J. 105, No. 1: 119-122 (July 1, 1937).—A general discussion of the essential factors in the design of a groundwood riffler.—A. P.-C.

Meeting Today's Standards of Paper Cleanness. F. X. Becker. Paper Mill 60, No. 26: 140-144 (June 26, 1937); Paper Trade J. 105, No. 1: 111-112 (July 1, 1937).—A brief discussion of the importance of cleaning stock and more particularly of the merits of the Centrifiner.—A.P.-C.

Wood Preparation. Paul F. Leuth. Pacific Pulp Paper Ind. 11, No. 4: 34-42 (April, 1937).—A general description and discussion of present day practice in wood room equipment and operation.—A.P.-C.

Wood Preparation in the Pacific Northwest. Fred Nicholson. Pacific Pulp Paper Ind. 11, No. 4: 26-27 (April, 1937).—A brief discussion of present-day practice drawing attention to two barking machines developed and built by the Stetson-Ross Machine Co., Seattle, Wash.—A.P.-C.

Instrument Control in Pulp Cooking. Malcolm B. Hall. Paper Mill 60, No. 26: 147-148 (June 26,

1937).—A discussion of what instruments can do and are doing to help produce better pulp.—A.P.-C.

Power Drives in the Paper Industry. Francis A. Westbrook. Paper Industry 19: 422-425 (July, 1937).—A brief description of various types of mechanical drives giving satisfactory service in mills in the Boston district and the lower Merrimac Valley.—A.P.-C.

Electric Drive for Paper Calenders. Anon. Ind. Papeterie 15: 171-185 (Aug., 1937).—A discussion of the more important factors to be considered in the selection of electric paper calender drives.—A.P.-C.

Supercalender Roll Load Indicator. C. D. DeMers. Paper Industry 19: 457 (July, 1937).—A brief outline of the importance and merits of the device.—A.P.-C.

Felt Conditioner for Paper Machines. Frederick W. Vickery. Brit. pat. 462,007 (March 1, 1937).—A felt cleaner and conditioner comprising a suction box operating on less than the width of the felt across which it is traversed, has a perforated endless band of ring, e.g., of metal or fabric impregnated with synthetic resin, encircling the suction box and running between it and the felt.—A.P.-C.

The Cleaning of Press Felts. Papeterie 59: 554-558, 602-606 (June 25, July 10, 1937).—A brief description and discussion of the cleaning and washing of press felts, especially for fine papers, emphasizing the merits of the use of sulphonated fatty acid and alcohol derivatives.—A.P.-C.

Paper Machine Press. Wm. J. Millspaugh. Fr. pat. 806,938.—In a three-roll press comprising lower and intermediate suction rolls and a top pressure roll, the intermediate suction roll is covered with a soft rubber jacket having holes that register with those in the metal shell.—A.P.-C.

Feltless Paper or Board Machine Press. Vincent de Montgolfier. Fr. pat. 808,160.—The paper is supported to a point close to the press. The latter comprises two plain press rolls with an intermediate felt-jacketed roll, with suitable means for adjusting the pressure between the rolls and for washing the felt-jacketed roll.—A.P.-C.

Motor-Driven Top Press Rolls Increase Speed and Reduce "Crush." W. L. Bende. Paper Trade J. 105, No. 8: 25-26, 28 (Aug. 19, 1937).—A description of the direct top and bottom press roll electric drive, with a discussion of its performance and merits.—A.P.-C.

Process for the Machine Finishing of Paper. Maurice Mougeot. Fr. pat. 812,939 (Jan. 25, 1936).—A Yankee machine can be used to produce either glazed or unglazed paper by providing a suitable device for applying a film of liquid, pasty or gelatinous material to the surface of the Yankee drier just ahead of the point where the sheet comes into contact with it. The device may be brought into operation or cut out while the machine is running. By using a liquid such as paraffin oil the paper may be simultaneously impregnated and waterproofed.—A.P.-C.

A Modern Installation for the High-Speed Manufacture of Light-Weight Papers. Ind. Papeteries 15: 147-161 (July, 1937).—A description of the machine installed in 1934 at the mill of the Papeteries de Pont-de-Claix.—A.P.-C.

Device for Cleaning Paper Machine Wires and Rolls. Rohrbacher Lederfabrik Jos. Poeschl's Sohne A. G. Fr. pat. 812,599 (Oct. 28, 1936).—Table rolls and roll doctors are covered with waterproofed hardened leather, and the edges of doctor blades are made of the same material.—A.P.-C.

Apparatus for and Method of Deckling Paper. Courtlandt B. Griffin, assignor to Carew Manufacturing Co. U.S. pat. 2,084,278 (June 15, 1937).—The edges of a stock of sheets clamped under considerable pressure are subjected to the action of a jet of water under pressure and then streams of air under high pressure are directed more or less angularly to the plane of the sheets to remove material along the edges of the sheets. (Cl. 92-68).—A.P.-C.

Colloidal Mill. Frank G. Crane assignor to Frank G. Crane, Jr. U.S. pat. 2,072,710 (March 2, 1937).—A horizontal drum is provided at the bottom of one end with a discharge opening having a hand and valve and at the top of the other end with an inlet opening connected by rubber tubing to the bottom of a funnel which is mounted so that it is vibrated during the operation of the machine. Mounted on a horizontal shaft passing through the axis of the drum are a series of spaced parallel inclined disks having milled or toothed edges which co-act with the inside cylindrical surface of the drum. The machine is more particularly intended for homogenizing or "viscolizing" color and size for coating paper. (Cl. 88-13).—A.P.-C.

Web Control Mechanism. Robert McC. Johnstone, assignor to Cameron Machine Co. U.S. pat. 2,082,635 (June 1, 1937).—The paper supply roll is mounted so as to be displaceable sideways. The web carries a body of conductive material, suitably a longitudinal line of metallic ink. Electrical contact members are provided above the sheet, with which the line of metallic ink will make contact if the web is displaced sideways, and this is used to operate a motor that displaces the supply roll thereby bringing the web back into proper position. (Cl. 242-76).—A.P.-C.

Machine for the Barking or Cleaning of Logs. F. Gobl, Hannover, Germany. Swed. pat. 87, 547 (March 5, 1934).—The action takes place with a rotating disc shaped cutter.—J.F.O.

Process for the Barking of Pulp Wood. Wikmanshytte Bruks A. Bol. Wikmannshyttan. Swed. pat. 87,908 (Aug. 12, 1933).—A process using warm water and also high pressure to wash the bark away.—J.F.O.

Device for Filter Presses. Glommens Mek. Vaerksted A/S. Fredrik stad. Nor. pat. 55,888 (Jan. 24, 1935.—J.F.O.

Conveyor Device on Machines for the Manufacture of Thick Fibrous Plates. A/S. Thunes Mek. Vaerksted, Oslo. Nor. pat. 57,237 (Oct. 22, 1932).—J.F.O.

Cylindrical Screen for Paper and Similar Machines. Firma F. H. Riedel, Raschau. Ger. pat. 640,310 (Aug. 11, 1933).—J.F.O.

Influence of the Wire Shake on the Properties of the Paper. I. W. Kramarew. Zellstoff U. Papier 17, No. 5: 196-97 (May, 1937).—The good qualities of light weight rag papers are due mainly to the dilution of the stock, the speed of the stock onto the wire and the shake. Increasing the shake increases the tear, porosity and opacity. The most favorable stroke for light weight paper was between 5 and 7 mm. and the frequency of the shake 260 to 280 per minute. Results of mill tests on three

machines and for three light weight papers are tabulated.—J.F.O.

Shake Device Without the Bolt Link. G. Antonoff. Zellstoff u. Papier 17, No. 5: 197-98 (May, 1937).—Short description of a shake without the bolt link. Illustrations accompany the description. —J.F.O.

Progress in the Treatment of the Screenings in the Manufacture of Ground Wood. Wochbl. Papier Fabr. 68, No. 14: 260-64; No. 15: 281-285; No. 16: 296-98 (April 3-17, 1937).—The following topics are described; the evolution of the refiner up to the modern vertical; comparison between the horizontal and verticle refiners; the considerably lower power consumption with the production of a material free from shives; other types of refiners; and progress in the use of refiner stones, especially the self sharpening stone. Several illustrations and tables are presented to show types and performance.—J.F.O.

Device for the Slitting of Webs of Paper, Board, Metal, Horn Fiber and Similar Materials. Goebel A. G. Darmstadt. Ger. pat. 641,235 (March 23, 1935).—J.F.O.

Device for Warming the Felt in the Press Section of a Paper Machine. Thomas Joseph Heimbach G. m. b. H., Duren. Ger. pat. 641,451 (July 27, 1934). The felt is warmed on passing over a perforated roll, the same roll that the paper first comes in contact with the felt. Heating the felt assists in the removal of the water.—J.B.O.

Injuries to Paper Felts. H. Mendrzyk, Berlin-Dahlem. Papier-Fabr. 35, No. 16: 125-28 (April 16, 1937). The damaging effect of alkalies and acids, bacteria, insects, and the mechanical defects on the wet and dryer felts are briefly described.—J.F.O.

Mechanical Process

Artificial Stones for Different Kinds of Groundwood Pulp. R. I. Wynneberts. Pulp Paper Mag. Can. 38: 496-498 (June, 1937).—A brief discussion of artificial pulp stones developed by the Norton Co. for the production of different grades of groundwood.—A.P.-C.

Pulpstone. Thure Larsson assignor to Norton Co. U. S. pats. 2,078,451, and 2,078,452 (April 27, 1937).—*No. 2,078,451*—The pulp stone comprises an integral, cement, central portion with segmental abrasive blocks spaced around the center portion and shaped to form a cylindrical peripheral portion. Wedge blocks are located in cut-out portions of the segmental abrasive blocks and are located in the planes of the cracks between the abrasive blocks. Bolts are embedded in the center portion, and rotatable nuts are placed in the wedge blocks so as to co-operate with the bolts, there being enlargements of the cracks which coincide with the location of nuts so as to permit of tightening the abrasive blocks against the center portion from the outside of the stone. *No. 2,078,452*—The center portion of the stone is surrounded by a series of abrasive segments whose angular displacement is nearly but not quite great enough to extend all the way around, thus leaving crevices between the segments. Means are provided for holding the segments to the center portion and leave crevices between adjacent segments. A number of ridges are formed integral with and extending from a segment at each crevice. A filler is inserted in each crevice flush with the plane of one segment and contacting the ridges on the other side of the crevice and terminates substantially at the plane of the ridges, so that the filler will be compressed by the ridges in the event of expansion of the stone. (Cl. 51-206,207).—A.P.-C.

Rebuilding Pulp Grinder Shafts. C. H. S. Tupholme. World's Paper Trade Rev. 108: TS65-66. (Aug. 13, 1937).—A brief description of rebuilding by means of bronze welding of worn down pulp grinder shafts, showing the merits of this procedure. —A.P.-C.

Fungal Infection of Groundwood Pulp. E. Rennerfelt. Pulp Paper Mag. Can. 38: 561-568 (July, 1937).—A study of the occurrence of fungi in groundwood pulp, dealing with their sources, development in pulp and remedial measures.—A.P.-C.

Value of Automatic Temperature Control in the Production of Groundwood Pulp. C. D. DeMers. Paper Mill 60, No. 26: 77-81 (June 26, 1937); Paper Trade J. 105, No. 1: 104-106 (July 1, 1937). —A 14-day test carried out in 1936 in a Canadian groundwood mill showed: (1) that with automatic temperature control grinding temperatures were maintained within 2 to 4 deg. of any definite pre-determined point; (2) a material increase in production; (3) a definite decrease in power consumption per ton of stock; (4) a more uniform freeness in the stock produced; (5) indications of a lower stone cost due to a longer period between burring operations and the elimination of damage to stones caused by wide fluctuations in temperature under hand control.—A.P.-C.

Production of Wood Wool. Maximilian Ledere, assignor to Alexander Singer. U. S. pat. 2,074,590 (March 23, 1937).—Before converting into wood wool, wood is pretreated with steam under a pressure slight above atmospheric. (Cl. 92-6).—A.P.-C.

Pulpstone. Hugo W. H. Beth, assignor to Norton Co. U. S. pat. 2,079,787 (May 11, 1937).—The invention is an improvement on Benner and Stowell's U. S. reissue patent 19,678 and consists in providing, between the segments of a built-up stone, compressible fillers which will be deformed under the pressure of expansion when the stone is heated. (Cl. 51-207).—A.P.-C.

Ceramic Grind Stones and Its Manufacture in the Soviet Union. Wochbl. Papier Fabr. 68, No. 20: 370 (May 15, 1937)—After a brief description of the advantages of artificial grind stones, of American and German makes, the performance of several artificial stones of Russian manufacture is given.—J.F.O.

Grinding Fibrous Materials in Presence of Caustic Alkali. S. P. Pilipenko. Kozhevenno-Obuvnaya Prom. U.S.S.R. 15, no. 7:57-59 (1936); C. A. 31: 7642—Use of a 0.2-0.5 per cent sodium hydroxide solution in the grinding of fibrous material reduces the time required on account of its softening action on the fibers; it neutralizes the effects of the intermicellar spaces and thereby increases the swelling (hydration) of the fibers, resulting in a decrease of the power required to effect fibrillation. The swelling of the fibers facilitates the production of denser board and increases the active surface of the micelles, thereby increasing the absorbency of the fibers and consequently facilitating sizing.—C.J.W.

Manufacture of Newsprint Without a Beater. Wochbl. Papier-Fabr. 68, no. 17:322; no 24:451 (April 24, June 12, 1937); B.I.P.C. 8:66.—The inquirer asks for information concerning the most suitable grain size of pulp stones and types of screens for mechanical pulp for newsprint manufacture,

whether beating of the chemical pulp is essential, and the mixing of the pulps in ordinary mixing chests instead of beaters satisfactory. All modern newsprint mills work without beaters nowadays; the mechanical process should be under strict control and screening comprise at least two, better three, steps. Mixing in chests is entirely satisfactory.—C.J.W.

Refining of Groundwood Screenings. Wochbl. Papier-Fabr. 68, no. 21: 402; no. 24:451; no. 25: 473; no. 26:491; no. 27:509 (May 22, June 12-26, July 3, 1937); B.I.P.C. 8:85.—The inquirer asks for methods of refining groundwood screenings obtained in the manufacture of leather boards so that they can be used for wrapping paper. The screenings are often returned to the grinder; they cause, however, the plugging up of the stone and yield a very short-fibered pulp which is not suitable for all purposes. Some use kollergangs, rod mills, or beaters with basalt tackle as refiners. Others suggest cooking the screenings in rotary boilers under pressure with the addition of either lime or soda and claim a complete utilization of the waste. The writer of one reply states that he found all methods too expensive so that he just dried it and used it as fuel under the boiler.—C.J.W.

Storing of Moist Groundwood Pulp. Wochbl. Papier-Fabr. 68, no. 17:332; no. 21:402; no. 22:417; no. 24:451 (April 24, May 22, 29, June 12, 1937); B.I.P.C. 8:77.—The inquirer asks for a method of storing bleached or unbleached groundwood pulp with a moisture content of 60-70 per cent up to eight months without the occurrence of mold formation. There is no use of storing groundwood pulp bleached with bisulphite, because the brightening effect is again lost on storage. Several methods exist for storing unbleached groundwood pulp for a number of months up to a year and even more. The use of sound and healthy wood is a prerequisite. Pits dug into the ground have been successfully used; the water drains through the bottom and the pulp settles tightly with exclusion of air. The new Gilg silos follow the same principle. Storing upon porous floors (no wood boards) in piles in well ventilated sheds and protected from freezing has proved quite satisfactory. In this method the outer bales will dry out and become hard. Others have sprayed the bales with a solution of formic acid or formaldehyde and thus protected the pulp against fungus attack.—C.J.W.

Grinding Southern Pine Under Semi-Commercial Conditions. W. J. Walker. Tech. Assoc. Papers 20: 379-389 (June, 1937); Paper Trade J. 105, No. 12: 44-54 (Sept. 16, 1937).—A description of the work carried out at the Pulp and Paper Laboratory of the Industrial Committee of Savannah since its inception in 1932, the results of which are presented in tabular and graphical forms. The results show that groundwood suitable for the manufacture of news print can be obtained, and indicate that the properties of the pulps produced are greatly affected by stone surface and stone structure.—A.P.-C.

Apparatus for Removing Steam from Grinders. Frank W. Partsch, assignor to J. O. Ross Engineering Corp. U.S. pat. 2,093,478 (Sept. 21, 1937).—An openside chamber is located a short distance above the opening between the stone and the dam of the pool of pulp, and this chamber is connected to a suitable exhausting system. (Cl. 83-75).—A.P.-C.

Colloid-Chemical and Chemical Differences Between Spruce Wood and Ground Spruce Wood. Carl G. Schwalbe. Papier-Fabr. 35, no. 27: 243-47 (July 2, 1937).—Spruce wood and ground spruce wood are not identical in either their colloido-chemical or in their chemical characteristics. The hygroscopic properties of spruce wood at medium atmospheric moisture and in a room nearly saturated with steam from water are considerably reduced by the grinding process. The sensitivity of ground spruce wood to heating, ozone and sunlight is much greater than that of very thin spruce wood shavings. The rapid turning yellow of ground spruce wood in sunlight seems to be caused by the abstraction of carbohydrates during the grinding process; at least a greater constancy of colour in sun-light can be obtained by imbibing the ground spruce wood (news print) with sugar solutions (grape sugar, honey).—J.F.O.

Method for the Prevention of the Formation of Mildew and Putrifaction in Ground Wood and Pulp. Sten O. Berger. Finn. pat. 17,458 (June 22, 1935).—The raw material is treated with oxalic acid, formic acid, acetic acid or methyl alcohol before the grinding or cooking process. Oxalic acid can be added during or after the process.—J.F.O.

Mills

An Old Italian Paper Mill. Raffaele Sansone. Paper Industry 19: 300-301 (June, 1937).—A brief description of an unnamed Italian mill which still profitably makes paper in a quite primitive manner. Co.—A.P.-C.

Champion's Sulphate Pulp Mill in Texas. Harry E. Weston. Paper Industry 19: 303-307, 335 (June, 1937).—A description of the sulphate pulp mill at Pasadena, Texas, of the Champion Paper and Fibre. —A.P.-C.

Highlights on Crossett. Harry E. Weston. Paper Industry 19: 165-175 (May, 1937).—A description of the Crossett, Ark., pulp and paper mill of the Crossett Lumber Co.—A.P.-C.

St. Regis Making Full Bleached Kraft at Tacoma from Western Hemlock. Anon. Pacific Pulp Paper Ind. 11, No. 6: 10-26 (June, 1937).—A description of the 160-ton bleached kraft mill of St. Regis Kraft Co., at Tacoma, Wash.—A.P.-C.

Pulp and Paper in British Columbia. Anon. Can. Chem. Met. 21: 155-157 (May, 1937).—A brief description of the plants of the British Columbia Pulp and Paper Co. at Port Alice and Woodfibre, and of the hydrosulphite process for bleaching groundwood. —A.P.-C.

Oulu Osakeyhtio's New Sulphate Mill. Finnish Paper and Timber J. 19, no. 7A:276-278 (in English); 364, 366-368 (in Finnish) (April, 1937); Wochbl. Papierfabr. 68, no. 21:398 (May 22, 1937). An illustrated description of the new Finnish sulphate mill is given, which was erected in connection with the saw mill Pateniemi and utilizes the wood waste from the latter.—C.J.W.

Electric Illumination of the Mill. Ivar Folcker. Svensk Papper-Tidn. 40, no. 7:161-167 (April 15, 1937); Bull. Inst. Paper Chem. 7:332.—The author emphasises the importance of adequate illumination in general and reviews recent developments in electric lighting with special reference to mercury and sodium lamps. Sufficient lighting of mill yards is

just as important as good illumination of the different inside sections of a mill.—C.J.W.

Paints for the Maintenance of Paper Mills. G. C. Attfield. Proc. Tech. Sect. Paper Makers' Assoc. 17: 399-410 (1937).—Numerous types of paints and their application in paper mills are described.—A.P.C.

Application of Gear Motors and Speed Reducers in the Paper Industry. R. S. Marthens. Paper Trade J. 105, No. 1: 125-126 (July 1, 1937).—An analysis of the applications which are peculiar to the pulp and paper industry, with recommendations regarding the application of motors to the various operations where speed reduction is required.—A.P.-C.

Some Electrical Drives Recently Installed in Paper Mills. W. Acton. World's Paper Trade Rev. 107: 182, 216, 218, 271-276, 281-286 (Jan. 15, 22, 1937).—A description of installations made in paper mills during the past 4 yrs. of drives for auxiliary gear and paper machines of the single-motor drive.—A.P.-C.

Heating and Ventilating Developments, 1936-37. A. E. Montgomery. Paper Trade J. 104, No. 20: 51 (May 20, 1937).—A very brief outline.—A.P.-C.

Prevention of Boiler Scale and Corrosion. William R. Gibson. Pacific Pulp Paper Ind. 11, No. 2: 30, 32 (Feb., 1937).—A brief discussion.—A.P.-C.

Steam for the Board Mill. Samuel Blum. Paper Mill 60, No. 26: 53-62 (June 26, 1937).—A general discussion of steam consumption in board mills using purchased pulps.—A.P.-C.

Colloid Milling Questions and Answers. H. L. Bullock. Tech. Assoc. Papers 20: 309-310 (June, 1937); Paper Trade J. 105, No. 8: 47-48 (Aug. 19, 1937).—A brief discussion of the application of the colloid mill in the paper industry and of its merits.—A.P.-C.

An Interesting Problem in Steam. A. D. Harrison. Pulp Paper Mag. Can. 28: 620-624 (Aug., 1937).—At the Thorold mill, Ontario Paper Co. have recently installed a complete new boiler plant with steam turbines to replace electric boilers. At the new Baie Comeau, Que., plant of the same company electric boilers are being installed and no power is being produced by steam. A brief outline is given of these two developments and of the problems encountered as they arose.—A.P.-C.

Supplementing Steam-Electric with Hydro-Electric Power. L. B. Rogers. Paper Industry 19: 552-554 (Aug., 1937).—A description of the installation at the Lawrence, Mass., plant of Champion-International Co., where steam and water turbines are operated in parallel with automatic regulation whereby the water-driven generators take care of the excess electrical load over that carried by the steam turbine driven generators, the latter being operated so as to give the amount of steam required for process work.—A.P.-C.

Soundview Completes Expansion Programme. Anon. Pacific Pulp Paper Ind. 11, No. 8: 8-24D (Aug., 1937).—A detailed description of the Everett, Wash., 500-ton bleached sulphite mill of the Soundview Pulp Co.—A.P.-C.

Sulphite Mill Construction Materials. J. D. Miller. Tech. Assoc. Papers 20: 218-219 (June, 1937); Paper Trade J. 105, No. 5: 35-36 (July 29, 1937).—A summary of replies received from 34 mills to a questionnaire covering the more common service points as regards alloy steels and other materials in use in the various mills together with some other points of general interest.—A.P.-C.

Monel Metal in the Paper Industry. Anon. Papier 40: 583-590 (July, 1937).—A discussion of the various actual and possible applications of monel metal in paper mills.—A.P.-C.

Paper Mills Save with Laminated Plastics. F. Parke Mattison and C. Eugene Center. Paper Industry 19: 555-557 (Aug., 1937).—A description of actual experiences of the Rumford, Maine, mill of Continental Paper and Bag Corp., with doctor blades, gears and bearings made of laminated resinous materials of the plastics family.—A.P.-C.

The Use of Metals in the Paper Making Industry. F. W. Tomlinson. World's Paper Trade Rev. 107: 1053-1056, 1090, 1092, 1130, 1133, 1167-1168, 1200, 1202, 1240, 1242, 1272, 1274, 1312 (April 2-23, 1937).—A review of metals for the paper making industry, covering the various classes of copper-rich alloys and outlining such of their properties as may be thought to concern the paper mill equipment manufacturers or paper makers when replacing old, or selecting new, materials.—A.P.-C.

Nickel Alloy Steels and Cast Irons in the Pulp and Paper Industry. A. G. Zima. Pacific Pulp Paper Ind. 11, No. 3: 23-34 (March, 1937).—A description of the progress achieved in the development of nickel alloy steels and cast irons for the pulp and paper industry, calling attention to the benefits that may be derived from their use.—A.P.-C.

The Physical Basis of the Target Plate Steam Trap. Hans Richter. Wochbl Papier 68, No. 19: 354-56 (May 8, 1937).—Description of the steam trap.—J.F.O.

Miscellaneous

The Use of Liquefied Gases in the Chemical Pulp and Paper Industry. Papeterie 59:262,265 (March 25, 1937).—A brief discussion of the advantages of the use of liquid chlorine and liquid sulphur dioxide in the pulp and paper industry.—A.P.-C.

The Significance of Water. Hervey J. Skinner. Paper Trade J. 104, No. 12: 67-72 (March 25, 1937).—A discussion of objectionable impurities in water, such as color, suspended matter, iron, manganese and hardness together with methods for their removal. The necessity of water softening for boiler purposes and sometimes for making up size solution is pointed out and a brief comparison of softening by the lime-soda and zeolite processes is made. Chlorination for slime prevention and corrective treatment for corrosive waters is also touched upon. The importance of efficient chemical control of water is stressed.—A.P.-C.

Non-Fibrous Raw Materials Trends. James A. Lee et al. Paper Trade J. 104, No. 17: 35-39 (April 29, 1937).—A report of the TAPPI Non-Fibrous Materials Committee, reviewing trends during 1936.—A.P.-C.

Prevention of Foaming in Paper Manufacture. Donald K. Pattiloch. Can. pat. 364,382 (Feb. 23, 1937.)—The formation of foam in fiber-water mixtures is controlled by adding a soluble aluminate to bring the *p*H to a value between 4.6 and 5.6. If the pH value is greater than 5.6, it is reduced below 4.6 by adding acid and then increased to the desired value by means of aluminate.—A.P.-C.

The Filters of the Societe "L'Alfa". Anon.

Papeterie 59: 222 (March 10, 1937).—A brief description of the poison-gas filters of the Société L'Alfa, consisting essentially of two activated charcoal units and a unit made of "Diatrose", a special heavy cardboard.—A.P.-C.

Paint for Building and Structural Uses. F. L. Browne. Pulp Paper Mag. Can. 38: 346-347 (April, 1937). — A brief general discussion. — A.P.-C.

The Choice of Paint. M. W. Ballantyne. Pulp Paper Mag. Can. 38: 348-349 (April, 1937).—A brief discussion of the advantages of using good quality paint.—A.P.-C.

Light and Paint. Anon. Pulp Paper Mag. Can. 38: 343-344 (April, 1937).—A brief discussion of important factors in the illumination of mills.—A.P.-C.

The Floodlighting of Paper Mill Yards. S. W. Stock. Pulp Paper Mag. Can. 38: 344-346 (April, 1937).—A brief discussion of its advantages and of available equipment.—A.P.-C.

Molybdenum and the Paper Industry. Léon Dempyr. Papeterie 59:309-310 (April 10, 1937).—A brief outline of the properties and uses of molybdenum, and of its possible applications in the paper industry.—A.P.-C.

Groundwood Hazards and Their Elimination. T. W. Small. Trans. 25th Natl. Safety Congr. 1936: 350-352—A.P.-C.

Paper Mill Safety From the Workman's Standpoint. John L. Sullivan. Trans. 25th Natl. Safety Congr. 1936: 356-358.—A.P.-C.

Paper Mill Safety From a Supervisor's Standpoint. George D. Fuller. Trans. 25th Natl. Safety Congr. 1936: 354-356.—A.P.-C.

The Origins of Paper: Its History and Role as a Vehicle for Thought Through the Ages. Y. Oddon and J. Oddon. Papier 40: 27-36, 119-125 (Jan., Feb., 1937).—A general discussion.—A.P.-C.

Filler Retention Slide Rule. O. K. Graef. Paper Industry 19: 59-60 (April, 1937).—A description of the construction and method of using a slide rule for predicting the retention of filler in a new sheet, based on the formula $F=f\sqrt{W/w}$ in which F and f are the percentage of filler retention at basis weight W and w, respectively, and W and w are the basis weights of the new and of a previous sheet, respectively.

United States Patents on Paper Making. First Quarter, 1937. Clarence J. West. Paper Trade J. 104, No. 17: 31-34 (April 39, 1927).—A list in numerical sequence of patents relating to pulp and paper making issued at Washington during Jan., Feb. and March 1937.—A.P.-C.

The Pulp and Paper Industry's Need for Technological Service Is Greater Than Ever. Grellett N. Collins. Pulp Paper Mag. Can. 38: 288-290 (March 1937).—An address.—A.P.-C.

Physics in the Paper Industry. E. W. Samson. J. Applied Physics 8, no. 7:455-461 (July, 1937); Bull. Inst. Paper Chem. 7:437.—The author tries to convey a picture of the present and future place of the physicist in the paper industry by describing some of the typical physical problems which confront it. Those mentioned discuss the efficiency of machines and processes, automatic control, hydrodynamics of pulp suspensions, and the physics of surfaces and colloids. There exists, however, still many others which call for the methods and knowledge of the physicist, in spite of the fact that the industry managed to get along for nearly two thousand years without apparently missing him—C.J.W.

Papermakers' Problems. Harry F. Lewis. Oil, Paint and Drug Reptr. 132, no. 1:29 (July 5, 1937).—Problems of pulp and paper manufacture vary greatly in nature and often require for their solution the help not only of the chemist, but, also of the physicist, the wood technologist, the microscopist, and the bacteriologist. Examples from the various fields are given.—C.J.W.

The Standardization of Paper. Arnold Ingram MacNaughton. World's Paper Trade Rev. 107: TS33-37 (June 18, 1937).—A discussion explaining the scope and advantages of proper paper standardization.—A.P.-C.

Progressive Forces in the Paper Industry. George R. Wallace. Paper Mill 60, No. 26: 47-48 (June 26, 1937); Paper Trade J. 105, No. 1: 102-103 (July 1, 1937).—A brief discussion of the importance of technical men and developments of modern machinery to the paper industry.—A.P.-C.

United States Patents on Paper Making, Second Quarter, 1937. Clarence J. West. Paper Trade J. 105, No. 3: 31-34 (July 15, 1937).—A list in numerical sequence of patents relating to pulp and paper making issued at Washington during April, May and June, 1937.—A.P.-C.

A New Era for Chemistry in the South's Wood Pulp Industry. Harold R. Murdock. Paper Trade J. 104, No. 22: 28-29 (June 3, 1937).—A brief outline of the possibilities of the wood pulp industry in the southern United States.—A.P.-C.

Current Research on Pulp and Paper in the Government and University Laboratories of the United States and Canada. Clarence J. West. Paper Trade J. 104, No. 24. 47-55; No. 25: 35-45 (June 17, 24, 1937).—A list of the projects at present being studied, the investigators carrying them out, their purpose, accomplishments to date and work at present in progress.—A.P.-C.

Scientific Control in Paper Making. Stephen R. H. Edge. World's Paper Trade Rev. 107: TS20-25 (May 21, 1937).—An address describing the type of work which is necessary before scientific control over any particular paper making problem becomes possible (illustrated by outlining some of the work done by the author on pitch troubles, measuring the shade of tinted and colored papers, mechanism of rosin sizing, acidity of paper, condition of cellulose in paper, etc.), and outlining such control as is now being exercised (or can be exercised whenever there is need) in the manufacture of current grades of paper.—A.P.-C.

Some Aspects of Modern Pulp Manufacture. Cösta Hall. World's Paper Trade Rev. 107: 340, 342, 378-386, 420, 422, 458-464, 500, 502, 538-544, 580, 582, 618-624, 732, 734, 770-776, 813-816, 850-855, 973-976, 1008 (Jan. 29, Feb. 5, 12, 19, March 5, 12, 26, 1937); Paper Maker 93: TS37-47, 57-63 (March, April, 1937).—A review and discussion of some of the more important aspects of the technical development in the Scandinavian pulp industry in recent years.—A.P.-C.

History of Kraft Paper Industry in Louisiana. George W. Mitchell. Paper Industry 19: 426-430 (Aug., 1937).—A.P.-C.

Modern Paper Making Practice in European Mills. Frank Lang. Pulp Paper Mag. Can. 38:

557-560 (July, 1937).—An account of personal observations.—A.P.-C.

Development Report of Operating Division of TAPPI. H. C. Schwalbe. Tech. Assoc. Papers 20: 324-327 (June, 1937); Paper Trade J. 105, No. 5: 42-45 (July 29, 1937).—A review of recent developments in the preparation of non-fibrous materials, mechanical pulping, alkaline pulping, acid pulping, stuff preparations, and finishing.—A.P.-C.

Paper Technology in 1936. Julius Grant. World's Paper Trade Rev. 107: TS2-7 (April 30, 1937).—A brief resume of the principal advances which took place in the various branches of the industry in 1936, with a bibliography of 69 references.—A.P.-C.

Technical Nuances in the Pulp, Ground Wood and Paper Manufacture During the Year 1936. H. Mowry. Zellstoff u. Papier 17, No. 3: 97-102; No. 4: 157-58; No. 5: 193-96 (March-May, 1937).—Through the aid of numerous references in the literature and patents the author briefly describes the following: Sulphite pulp manufacture, pre-barking by means of warm water under pressure for logs floated to the mill, a device for chip screens for removing the saw dust, new methods for screening chips, welded versus riveted digestors, de la Roza continuous cooking process, sulphite liquor and gas circulation in digestors, screening of pulp, cooking of straw, bleaching processes; ground wood, optimum grinding conditions, refiners for ground wood, new steaming method for brown ground wood, new beaters such as the Smith Egan, Thorsen Hery, Vortex and Arku, stock consistency regulators, sheet formation, Beloit horizontal presses, improvements on the dryer section, calenders, methods for reworking old waste paper, and other special topics.—J.B.O.

Calculations and Cost Accounting. Nils Fredrik Aall. Papir-J. 25, no. 12:184-188; no. 14:209-213 (June 30, July 31, 1937).—The author discusses certain principles and systems of cost accounting.—C.J.W.

Paper Machine Production Slide Rule. D. S. Davis. Paper Industry 19: 298-299 (June, 1937).—Description of the construction and use of a slide rule for calculating hourly paper-machine production from ream weight, speed, and width according to the formula $P = 5Bwv/A$, where P is the production in lb. of paper per hr., A is a constant dependent on the definition of the ream, B is the ream wt. in lb., w is the width of the machine in in., and v is the machine speed in ft. per min.—A.P.-C.

Stock Loss Slide Rule. D. S. Davis. Paper Industry 19: 431 (July, 1937).—A brief description of the construction and method of using a slide rule intended solely for determination of stock loss in white water.—A.P.-C.

Wood Cellulose. W. G. Campbell. World's Paper Trade Rev. 108: TS61 (July 16, 1937).—A brief review.—A.P.-C.

Paper Specialties

Treatment of Chromo Papers. Walter Hess. Kartonnagen-u. Papierwaren-Ztg. 41, No. 24:254; no. 25:264-265 (June 11, 18, 1937); Bull. Inst. Paper Chem. 7:436.—Hints are given for the correct packing, handling, shipping and storing of chromo papers prior to printing.—C.J.W.

Metal Papers, Manufacturing Processes, Conversion and Application. Kartonnagen-u. Papierwaren-Ztg. 41, no. 26:273-274; no. 27:281-282 (June 25, July 2, 1937); Bull. Inst. Paper Chem. 7:436.—A description is given of the manufacture of metallic papers, either in the form of foils pasted to a base paper or powders sprayed upon an adhesive surface or mixed with the adhesive and coated to the paper. The base paper should be well sized and have a smooth closed surface. It must be absolutely free from acids, chlorine, and sulphur.—C.J.W.

Creping of Asphalt Paper. Hans Schneider. Papier-Ztg. 62, no. 51: 845 (June 26, 1937).—Directions are given.—C.J.W.

Stencil Sheets for Multiplying Purposes, Typewriter Ribbons and Carbon Papers. Kolloid-Z. 79, no. 1:124-128 (April, 1937).—Review of German and American patents from 1930 to June 1, 1936.—C.J.W.

A Few Methods for the Longitudinal Creping of Paper. Gg. Boettinger. Papier-Ztg. 62, no. 47:786-787 (June 12, 1937).—American methods and patents.—C.J.W.

Permanent Stencils and Mimeographing Ink. Papier-Ztg. 62, no. 49: 818-819; no. 50:833-834; no. 51:850-851 (June 19, 23, 26, 1937); Bull. Inst. Paper Chem. 7:429.—The first stencils, invented in 1873 by T. A. Edison, were coated with wax; stencils now in use are made with a mixture of either nitrocellulose, resins, and waxes (Cellulose stencils), or a protein, glue, and protein solvent (protein stencils). The prescriptions are kept strictly secret by the manufacturers. It is recommended that stencils, mimeographing ink, and paper be bought from the same source, since they are then best suited to each other and will give the most satisfactory results.—C.J.W.

Hand-made Board, Machine-made Board and Carton. Papier-Ztg. 62, no. 61:1008 (July 31, 1937); Bull. Inst. Paper Chem. 8:17.—The author defines the three types as follows: Hand-made board is made on machines with one or two vats and lifted off by hand; machine-made board is manufactured upon Fourdrinier, cylinder, or combined machines with following dryer part. Cartons are made in the same manner and the logical difference would be the square meter weight. However, trade custom differentiates according to quality. The better classes are termed carton, such as chromo cartons, ivory cartons, etc.—C.J.W.

Curling of Friction-Calendered Paper. Papier-Ztg. 62, no. 38:649-650 (May 12, 1937); Bull. Inst. Paper Chem. 7:383. A paper mill, on account of complaints from the printer, asks how to avoid curling of friction glazed paper. Such paper is better suited for letterpress printing; when, however, required for lithography or offset, the paper mill should be informed, a double coated paper be chosen, which is first lightly friction-calendered and then supercalendered with a stone roll. All four sides should be trimmed. Sufficient aging and conditioning are also very important.—C.J.W.

Metal Foils in the Packaging Industry. Walther Hess. Kartonnagen-u. Papierwaren-Ztg. 41, no. 18:189-190 (April 30, 1937).—The use of metal foils, either as foil or pasted to carton, their advantages and possibilities in the packaging industry, are discussed. The most commonly used metal foils are those of tin, lead, and aluminum; the latter replaced almost entirely the two others. Aluminum foils are lighter, very flexible and suited for a large variety

of printing methods and embossing procedures; they are particularly fitted to protect the contents against air and moisture, and find a large application for wrapping cigarettes, tobacco, cheese, candy, etc.—C.J.W.

Recent Methods for After-Treatment or Impregnation of Board and Paper Products. Walter Obst. Kartonnagen-u. Papierwaren-Ztg. 41, no. 17:-177-178 (April 23, 1937).—Reference is made to recent methods for water and greaseproofing paper and board products. According to an American method waxed paper waste is heated in the beater until the wax and rosin melt; under constant beating carnauba or montan wax is eventually added, as well as hot silicate of soda which is precipitated with alum. Reference is also made to a Russian method for preparing a pulp substitute for cork stoppers by mixing broke from the paper machine with gelatin and tannin. The mixture is pressed into plates from which round stoppers are punched. These are eventually dipped into cellulose lacquers and dyed.—C.J.W.

Paper Made Fireproof, a New Agent and Its Application. Indian Print and Paper 2, no. 3:33-34 (March, 1937); Bull. Inst. Paper Chem. 7:341.—Reference is made to a series of fireproofing compounds for the cheap, and efficient treatment of timber plywood, wall boards, paper, and similar materials which were developed by Imperial Chemical Industries. Their basic constituent is monoammonium phosphate, the decomposition of which is responsible for the fireproofing effect.—C.J.W.

Choosing the Right Paper. Thoughts on Antique and Eggshell Finish. Paper and Printing Digest, May, 1937:1-9; Bull. Inst. Paper Chem. 7:340.—The difference between the two types of finishes consists in the lower bulking properties and somewhat smoother finish of eggshell paper as compared with antique finish. They are best suited for wood cuts, zinc etchings, or Ben Day plates, and similar engravings where they produce more attractive effects and offer the great advantage of quick drying; under ordinary conditions, they should not be used for halftones. Antique paper which receives no calendering, and eggshell which receive little calendering are naturally more absorptive than denser and smoother papers; their bulk or thickness makes a favorable quality impression.—C.J.W.

Removing the Paraffin from Paper Waste. Papier-Ztg. 62, no. 39-40: 672 (May 15, 1937); Bull. Inst. Paper Chem. 7:386. Reference is made to experiments for removing the paraffin with triethylene chloride from the waste of a mill manufacturing bread wrappers. A special extracting machine has been constructed and calculations are given covering the expenses involved and considering the value of recovered pulp and paraffin, and loss of solvent. According to these calculations, the extraction of paraffined paper can be put on a paying basis when at least 500 kg. of waste are available per day.—C.J.W.

Waterproof Containers Without Paraffin? Papier-Ztg. 62, no. 41:690 (May 22, 1937); Bull. Inst. Paper Chem. 7:386.—As a suggestion and inviting a discussion of the subject, the author discusses the possibility of using non-paraffined paper for drinking cups, pails, and containers for temporary uses, care being exercised that wax-treated paper is specified for purposes of longer storage. His idea is that so far no satisfactory methods for recovering paraffined paper exist and most of the waste is discarded.—C.J.W.

Choosing the Right Paper. Thoughts on Coated Paper. William B. Wheelwright. Paper and Printing Digest, Aug., 1937: 3-9; Bull. Inst. Paper Chem. 8:30.—The original purpose of coating paper was primarily to produce a surface better adapted to fine halftone printing than could otherwise be made. Hence, the logical reason for choosing coated paper is when fine halftone work is required. However, coated papers are more expensive, have less strength, are liable to crack at the corners of the fold, and require longer printing periods, thus adding to the printing costs. One must therefore at the outset decide what is more important: durability or extreme fidelity of reproduction. Emphasis is placed on the necessity of choosing the correct engravings and suitable inks.—C.J.W.

Paper and Resin. E. F. Lougee. Modern Plastics 14, no. 12:17-23, 66-69 (Aug., 1937); Bull. Inst. Paper Chem. 8:36.—The manufacture of industrial laminated material is described. It consists of a varying number of sheets of paper, fabric, or other material which has been impregnated with synthetic resins, dried and pressed together at elevated temperatures to form a tough, hard, and homogeneous sheet. Such sheets may vary in thickness from .002 in. up to solid blocks several feet thick. For the greatest volume of the material produced rag paper has been found the most satisfactory as a base. Numerous illustrations depict the individual stages of the manufacturing process.—C.J.W.

Gold Print Upon Different Paper. Papier-Ztg. 62, no. 56:934 (July 14, 1937); Bull. Inst. Paper Chem. 8:37.—Papers specially sized to the correct degree for gold print are naturally most suitable; if this special expense cannot be allowed non-picking papers should be chosen and a base lacquer be applied. When gold print is applied in combination with multi-color print, hard sized papers cannot be employed; in this case, the gold ink must be adapted to the paper by the addition of copal and drying agents.—C.J.W.

Cast Beer Mats from Groundwood Pulp. Papier-Ztg. 62, no. 25/26:459-430; no. 28:497-498 (March 27, April 7, 1937); Bull. Inst. Paper Chem. 7:343.—The process and machinery are described for casting round beer mats from refined groundwood rejects mixed with accepted groundwood pulp. By this method unnecessary waste is avoided; the plates, after passing a drying canal, can be printed in one or several colors by either the letterpress or offset process.—C.J.W.

Airmail Paper. Kurt H. Warnecke. Papier-Ztg. 62, no. 61:1014 (July 31, 1937); Bull. Inst. Paper Chem. 8:33.—Genuine Japanese tissue papers were at first used for this purpose; they have, however, the disadvantage, that no writing ink can be used on them. Reference is made to a new German product of the same basis weight, which is very strong, opaque and can be written upon with ink.—C.J.W.

Manufacture of Carbon Paper. Kurt H. Warnecke. Papier-Ztg. 62, no. 58:966 (July 21, 1937); Bull. Inst. Paper Chem. 8:33.—The raw materials and manufacture of carbon paper are described. Carbon papers are made in different weights according to the number of copies prepared at one time;

this factor should be taken into consideration before making a selection.—C.J.W.

Embossing Upon Paper and Board. Papier-Ztg. 62, no. 57: 943-944; no. 58:958, 960 (July 17, 21, 1937); Bull. Inst. Paper Chem. 8:32.—The author discusses different methods for importing special finishes or decorative effects upon paper and board by different embossing procedures, such as linen finish, pebble finish, embossing water-marks, etc.—C.J.W.

Recent Methods for the Manufacture of Surgical Cotton and Water-Resistant Pulp Products. A. Foulon. Pappen-u. Holzstoff-Ztg. 44, no. 29:311; no. 30:323-324 (July 16, 23, 1937); Bull. Inst. Paper Chem. 8:32.—Reference is made to number of patented methods for making pulp resistant to water without losing absorbency or becoming brittle. —C.J.W.

Linoleum Subsitutes, a Product of the Board Industry. Papier-Ztg. 62, no. 48:800-801 (June 16, 1937); Bull. Inst. Paper Chem. 7:414.—A product similar to roofing felt is described, which is impregnated with odorless asphalt and coated with rubber solutions, cellulose lacquers, etc.—C.J.W.

Machine for Waxing Paper. Lloyd L. Dodge, assignor to Rhinelander Paper Co. U.S. pat. 2,081,-324 (May 25, 1937).—The invention provides a machine for waxing paper whereby the transparency of the waxed paper is enhanced by subjecting the paper to a pre-waxing step, in the course of which the wax is caused to penetrate into and thoroughly impregnate the fibers. This step is followed by a second waxing step carried out in the usual manner. (Cl. 91-46).—A.P.-C.

Method and Means for Making Paper. Carl S. Hammersley. U.S. pat. 2,077,475 (April 20, 1937). —Waxed paper that is lighter in weight per ream than ordinary waxed paper, having improved appearance and greater transparency is produced by applying a wax coating to a base paper which is glossier and thinner than that which is ordinarily employed. The required thinness and glossiness are obtained by rewetting the paper in a special and accurately controllable manner at the instant when the initial calendering is commenced, i.e. at the point of entrance of the paper to the calender rolls. The wetting device comprises a brushing roll which cooperates with a roll partially immersed in a pan of water, and by regulating the speed of the brushing roll and the relative speeds of the two rolls the amount of spray delivered on to the paper can be accurately controlled. (Cl. 92-76).—A.P.-C.

Papers, Paper Boards, and the Like for Insulation. W. Whiteley and B. S. & W. Whiteley, Ltd. Brit. pat. 459,183 (July 4, 1935).—Synthetic resin is mixed with the pulp, which is then converted into paper and impregnated with transformer oil, wax, or other substance of good dielectric properties. The paper is finally heat-pressed to render the resin insoluble.—A.P.-C.

Moulding of Pulp Articles. Moulded Pulp Corp. Brit. pat. 461,732 (Nov. 16, 1935).—After introduction of a liquid suspension of pulp fibers into a foraminous mold at atmospheric pressure, a second suspension containing, if desired, fibers different in size and material from those in the first suspension, together with lacquer constituents, is introduced under pressure to flush the pulp layer, continue its deposition, and smooth its surface. A gaseous medium at more than 100 deg. C. is then introduced in two stages under low and then high pressure to complete the deposition and compact the fibers.—A.P.-C.

Resin-Fiber Products and Compositions. Bakelite, Ltd. Brit. pats. 461,271 and 461,272 (Aug. 14, 1935).—*No. 461,271.*—A phenol and an aldehyde are caused to react in presence of a fusible water repellent, e.g., limed rosin, pitch, wax; and aqueous dispersion of the product is worked up with a suspension of paper pulp. *No. 461,272*—A relatively large amount of a dry fiber or wood flour is kneaded with a fluid phenolic resin and the product is added to an aqueous suspension of the same fiber. The dried material obtained by either invention is sheeted and hot-molded. Improved uniformity is claimed.—A.P.-C.

Reinforced Paper. Ole Heye. Brit. pat. 458,336, (Dec. 17, 1936).—Papers for wrapping or building use comprise one or more layers of textile fabrics, e.g., jute, of 1 to 8 meshes per cm. stretched in both directions, treated with glue, oil, etc., dried if necessary, the meshes being filled with paper pulp or bitumen and compressed, and a layer of paper pulp is applied to one or both sides, the product being dried. There may be paper layers between the fabric layers, and the pulp, etc., may be dyed, impregnated, etc., before or after the meshes are filled.—A.P.-C.

Manufacture of Safety Paper. C. E. Every-Clayton assignee of F. Schoeller & Bausch. Brit. pat. 460,405 (May 20, 1936.—Paper is impregnated with inorganic salts which produce a distinctive color with both a mild reducing agent and an oxidizing agent; e.g., manganese ferrocyanide is added in the beaters and the paper is finally impregnated with a concentrated solution of alkali selenite.—A.P.-C.

Lithographic Re-Transfer Paper. L. Nestler, E. Nestler and K. Nauman. Brit. pat. 459,760 (March 25, 1936).—The re-transfer paper is provided with marks or lines formed by the application of a penetrating liquid dye, the marks being visible from both sides to indicate the general direction of the fibers for the purpose of pulling the paper off the stone. —A.P.-C.

Manufacture of Paper. P. T. Gale, F. Hamilton, R. J. W. Reynolds, and Imperial Chemical Industries, Ltd. Brit. pat. 462,254 (Sept. 4, 1935).—Inorganic cellulose esters are incorporated in the paper by addition, in dilute aqueous solution, to the beater furnish, which is then neutralized to litmus when admixture is complete.—A.P.-C.

Manufacture of Highly Polished Artificial Leather. Atlas Ago Chemische Fabrik A.G. Brit. pat. 458,637 (March 7, 1936).—A web of fabric, paper, etc., is coated with a smooth, glossy layer, e.g., of gelatin, and then with a varnish or lacquer; the whole is superimposed on the artificial leather with the interposition of an adhesive or solvent and united thereto under pressure. After drying, the auxiliary support of fabrics etc., is separated so that the varnish or lacquer coating remains on the artificial leather.—A.P.-C.

Special Moistener for Obtaining a Mirror-Like Finish on Paper or Board. H. L. G. Muller. Belg. pat. 418,259 (Dec. 31, 1936).—The paper or board is uniformly moistened by means of a water spray across the width of the sheet and the water is distributed over and into the sheet by passing over a pair of rolls.—A.P.-C.

Packing Material. Musher. Fr. pat. 805,398, (Nov. 18, 1936).—The packaging paper has an antioxidant such as oat flour or hydroquinone sprinkled thereon or incorporated therewith during manufacture to prevent oxidation of the material packed.—A.P.-C.

Cellulose Sponges. Jacques Lagelez. Pulp Paper Mag. Can. 38: 501-502 (June, 1937).—A brief description of the manufacture and merits of viscose sponges.—A.P.-C.

Paper Manufacture. D. M. Clark, assignee of J. A. Manning Paper Co. Brit. pat. 462,508 (June 24, 1936).—About 20 per cent of gum karaya, after hydrolysis with aqueous ammonia, is added to long-fibered pulps (e.g., Manila) immediately prior to feeding on to the paper machine, and preferably in the head-box. The gum is added in about 2 per cent aqueous dispersion after gently stirring for about 3 hrs. with 10 per cent of aqueous ammonia (specific gravity 1.22).—A.P.-C.

Production of Flexible Compound Sheet Material. F. J. Farrell. Brit. pat. 462,726 (Sept. 11, 1935).—Three plies of flexible material, the middle one being impregnated with benzylcellulose (and, if desired, a plasticizer), are united by heat and pressure.—A.P.-C.

Waterproofing Paper, Leather, Etc. Giovanni Campora. Fr. pat. 806,901 (Dec. 29, 1936).—The material is dipped into a bath or coated with a bath containing a solution of a colloid (joinery glue, gelatin) and a plastifier (ammonium lactate, glycerin). An insolubilizing agent (hexamethylene tetramine or formaldehyde solution) is added to the bath or atomized on to the material.—A.P.-C.

Safety Paper. Waldemar Zänker. Fr. pat. 806,805 (Dec. 26, 1937).—Bank notes, etc., are protected from imitation by a mixture of fluorescent materials having different fluorescences which are printed on to the paper, or incorporated therein during manufacturing. Thus, rayon is dyed with thioflavine, zinc hydroxide is precipitated on the fiber by a treatment with a solution of zinc sulphate and ammonia, and the rayon is treated in a semisaturated solution of sodium salicylate and beta-naphthol dissolved in caustic soda solution. The rayon is fixed with an acetone solution of the condensation products of phthalic acid and glycerin, cut up into small pieces or ground to powder and added to the paper furnish. Other examples are given.—A.P.-C.

Treatment of Paper and Product Resulting Therefrom. Louis Muller et Fils. Fr. pat. 810,694.—A strong paper (e.g., Manila hemp paper) is impregnated (suitably with a solution of synthetic resin) and cut into thin strips which are woven, knitted or natted to produce a continuous sheet that is flexible, waterproof, and has a high tensile strength in all directions.—A.P.-C.

Aniline Machines and Their Uses. J. B. Shaughnessy. Tech. Assoc. Papers 20, 365 (June, 1937); Paper Trade J. 105, No. 7: 44 (Aug. 12, 1937).—A brief discussion.—A.P.-C.

The Discoloration of Soap-Wrap Paper. W. R. Keating. Tech. Assoc. Papers 20: 243-248 (June, 1937); Paper Trade J. 105, No. 10: 41-46 (Sept. 2, 1937).—Discoloration of white paper by soap is due to the reaction of carboxylic cellodextrin with alkali and atmospheric oxygen or by the reaction of lignin with free alkali in the soap, or both. It is also probable that cellulose degradation products of less molecular weight than cellulose, particularly those containing aldehyde groups, react with alkali to cause a portion of the discoloration.—A.P.-C.

Helio and Offset Papers. G. M. Papeterie 59: 254-261, 310-314, 354-358 (March 25, April 10, 25, 1937).—A discussion of the qualities required of these two grades of paper with practical operating directions regarding their manufacture.—A.P.-C.

Manufacture of Paper and Board from a Mixture of Fibrous and Bituminous Materials. N. V. Bataafsche Petroleum Maatschapij. Fr. pat. 810,591 (Sept. 14, 1936).—In the manufacture of bituminized paper by addition to the stock in the beater of a bituminous emulsion which is subsequently broken by addition of an electrolyte, the retention of the bituminous substance is increased by addition of an alkaline solution of gelatinized starch. The starch may be added before or after the bituminous emulsion, but must be added before the electrolyte.—A.P.-C.

Medication of Sheets or Webs of Paper, Fabric, Etc., or Articles Made Thereof. H. G. Holland. Brit. pat. 464,884 (May 7, 1936).—Paper is impregnated with a disinfectant which is printed on it with a close pattern. The disinfectant, if colorless, is rendered visible by addition of a dye.—A.P.-C.

Process for the Production of Absorbent Paper. Ferdinand Dobber. Fr. pat. 811,017.—Sized or unsized is treated with a substance (alkali, acid, "wetting" agents) which modifies the condition of the surface of some or all of its constituents in such a manner that, after drying the treated paper is readily penetrated by liquids or collodial suspensions.—A.P.-C.

Waterproofing Maps, Paper or Fabrics. P. Fautrier. Belg. pat. 19,076 (Jan. 31, 1937).—Maps, paper, fabrics, etc., are waterproofed by treating with a mixture of gum, animal glue, potash alum, tannin, ether, potassium oxycyanide, formalin, sodium sulphoricinate, sodium permanganate, ethylolycol, talc and distilled water.—A.P.-C.

Wax in Impregnated Paper Cables. J. Lawton. World Power 26: 98-101, 129-130 (1936).—Available information relating to the formation of wax or "cheese" in oils used for cable impregnation is summarized.—A.P.-C.

Lacquered Papers. Walter D. Bowlby. Tech. Assoc. Papers 20: 364-365 (June, 1937); Paper Trade J. 105, No. 7: 43-44 (Aug. 12, 1937).—A general summary of the art.—A.P.-C.

Abrasive Papers. Anon. Papier 40: 501-502 (June, 1937).—A very brief description of their manufacture.—A.P.-C.

Security Paper. Felix Schoeller and Bausch. Fr. pat. 806,717 (Dec. 23, 1936).—An inorganic salt that gives a color reaction with mild reducing agents, such as sulphites, is added to pulp or paper; substances that give color reaction with oxidizing agents may also be used. The substances may be sprayed, painted, printed, etc., on paper. In examples, mercurous tungstate is precipitated on, or manganese tellurite is added to, pulp in the beater, or 10 per cent of manganese ferrocyanide is so precipitated and the paper impregnated with concentrated alkali selenite, or paper is printed with moist barium tellurite.—A.P.-C.

Manufacture of Packing and Fluid-Tight Materials. A. Carpmael assignee of I. G. Farbenindustrie A. G. Brit. pat. 465,044 (Oct. 25, 1935).—Pack-

ings for use in contact wtih fluorine comprise either fibrous material impregnated with oils or waxes or regenerated cellulose treated with fluorine under such mild conditions (diluted with nitrogen or carbon dioxide) that the products do not ignite. The treatment may take place during the early stages of use if desired.—A.P.-C.

Coating for Floor-Covering Material. Robert H. Pohl, assignor to Sloane-Blabon Corp. U. S. pat. 2,085,602 (June 29, 1937).—An impregnated felt floor-covering is coated with a water-vehicle backing paint. (Cl. 134-54).—A.P.-C.

Apparatus for Corrugating Paper. Joseph D. Cramer, assignor to The Chase Bag Co. U.S. pat. 2,085,417 (June 29, 1937).—The machine comprises a base plate having thereon a series of vertically disposed bedplates the rear ends of which are mounted on vertical pivots. The plates have convex upper edges with grooves through which pass endless travelling chains which form pleats in the paper as it passes over the bedplates. Means are provided for varying the distances between the forward ends of the bedplates and for adjusting the tension of the chains in the grooves. (Cl. 154-30).—A. P.-C.

Laminated Products and Methods of Making. Leslie T. Sutherland, assignor to The Barrett Co. U.S. pat. 2,082,854 (June 8, 1937).—Open- or close-structure materials (such as felts, kraft paper, etc.) are impregnated with a light hydrocarbon oil solution of coumarone resin containing an oil-soluble phenolic resin and preferably also a small amount of a condensing agent or accelerator such as hexamethylenetetramine. A number of plies of the saturated material are superimposed and pressed at a high temperature. Instead of mixing the coumarone resin and tar acid resin prior to saturation, the material may be saturated with coumarone resin, coated with a synthetic resin solution, and then hot pressed. (Cl. 154-2).—A.P.-C.

Safety Paper. Walter Schoeller. U. S. pat. 2,083,206 (June 8, 1937).—One of two components which enter into colored reaction with each other is added to the beater furnish or is spread over the surface of the finished paper, and the second component is brought upon the paper after applying over the first component a protective layer which is permeable to liquids or which is readily damaged mechanically. (Cl. 154-46.).—A.P.-C.

Process of Forming Resin-Impregnated Paper. Earl P. Stevens and Howard J. Billings, assignors to The Richardson Co. U.S. pat. 2,083,929 (June 15, 1937).—Pulp is mixed cold (suitably in a Werner & Pfleiderer mixer) with resin-making materials in presence of a suitable catalyst (such as ammonia) and of too little water to form a circulating medium; the temperature is raised to form the resin and bring it to the water-insoluble stage; the pulp is then worked up in the beater and sheeted on a paper machine and the paper subjected to any required treatment. (Cl. 92-21).—A.P.-C.

Manufacture of Transparent Sheet Material. George A. Richter, assignor to Brown Co. U.S. pat. 2,087,609 (July 20, 1937).—Paper, especially that which has been made translucent by suitable mechanical and (or) chemical treatment, is transformed to a perfectly clear and transparent state similar to cellophane, by subjecting to the action of suitable cellulose-gelatinizing media (preferably cuprammonium) solution, arresting the gelatinization at the proper time, and setting the gelatinized cellulose in situ in the paper. (Cl. 8-20).—A.P.-C.

Safety Paper and Method of Making Same. Francis L. Simons, assignor to George LaMonte and Son. U.S. pat. 2,085,675 (June 29, 1937).—A mononitrogen substituted naphthylamine is incorporated in the paper. (Cl. 91-67. 95).—A. P.-C.

Flexible, Impervious and Weatherproof Material. William W. Rowe, assignor to The Paper Service Co. U.S. pat. 2,085,473 (June 29, 1937).—Two layers of paper creped by means of a thermoplastic adhesive such as asphalt, are joined together with an intervening layer of burlap. (Cl. 154-50).—A.P.-C.

Safety Paper and Method of Making the Same. Francis L. Simons, assignor to George La Monte & Son. U.S. pat. 2,085,874 (July 6, 1937).—Aminodiphenyl (preferably the para isomer) is incorporated into the paper, with or without the addition of its primary monoamino homologues, derivatives, substitution products or salts. (Cl. 91-67.95).—A.P.-C.

Apparatus for Saturating Absorbent Articles. Stuart P. Miller, assignor to The Barrett Co. U.S. pat. 2,083,731 (June 15, 1937).—The apparatus is intended more particularly for saturating fibrous conduits. A saturating tank of a height sufficient to accommodate a maximum barometric column of saturant and provide a space thereabove is disposed within the container for the saturant so that the lower open end of the tank is immersed in and sealed by the saturating bath. An endless conveyor provided with suitable holders for the conduits passes into the bath, upwards through the liquid and head space of the saturating tank, down through tank again, under the liquid seal and out of the bath. (Cl. 91-46).—A.P.-C.

Molded Products. Guy C. Howard and Lloyd T. Sandborn, assignors to Masonite Corp. U.S. pat. 2,080,077 (May 11, 1937).—The fines separated from the fibers produced by the Mason "explosion" process are dehydrated to a moisture content of from 1 to 11 per cent (to serve as a plasticizer) and are molded under heat and pressure (under conditions that retain the plasticizer) to produce vitreous-like, highly dense products which are very dark to black in color. (Cl. 18-55).—A.P.-C.

Molded Products. Wm. H. Mason, Robert M. Boehm and Wilbur E. Koonce, assignors to Masonite Corp. U.S. pat. 2,080,078 (May 11, 1937).—Molding composition material suitable for laminated sheets, etc., is made by steaming lignocellulosic material under pressure at a temperature above the critical temperature of the lignocellulosic material for a time sufficient to alter the fiber structure throughout the predominant proportion of the material to a state of plastic flowability for hot pressure molding. As the initial lignocellulosic material, there may be used sawdust, etc. (Cl. 92-1).—A.P.-C.

Manufacture of Pulp Rovings. John C. Sherman. U. S. pat. 2,087,097 (July 13, 1937).—This is an improvement on Sherman's U.S. pat. 2,072,138, of March 2, 1937, and provides a new and improved method of rounding the pulp ribbons formed as described in the preceding patent, for the purpose of effecting their orderly delivery into a collecting system without sideway sway. (Cl. 92-39).—A.P.-C.

Paper Tacking Strip. Leslie F. Barnum. U. S. pat. 2,084,759 (June 22, 1937).—Paper which has been treated so that it will not absorb liquid asphalt

readily is formed into a core, which is then crushed by winding paper ribbons spirally around it. The composite is compressed into a reed and paper ribbons are spirally wound flat about the reed, adhesive being coated on to the inside surface of the flat wound ribbons while they are being wound. (Cl. 117-3).—A.P.-C.

Transparent Printed Wrapper and Method of Making the Same. Irving Gurwick, assignor to Shellmar Products Co. U. S. pat. 2,084,026 (June 15, 1937).—A fully transparent yet tinted color effect is obtained by coating an already manufactured sheet of transparent cellulose paper with a layer of coating of transparent ink, which is preferably a lacquer color that will dry bone-dry at low temperature (about 70 deg. F). (Cl. 41-21).—A.P.-C.

Matboard Handling Machine. Orland R. Sweeney, assignor to State of Iowa for the benefit of Iowa State College of Agriculture and Mechanical Arts. U. S. pat. 2,084,980 (June 22, 1937).—The invention provides: (1) a machine which eliminates the necessity of transferring the wet mats out of the line of the forming machine to another point at which they are fed to hydraulic presses; (2) a design of conveyor wire for the hydraulic press and modified forms of platens in the press which improve drying conditions; (3) use between the platens of adjustable springs to permit the upper platen to contact the mat board during the entire drying process and at the same time prevent the application of excessive pressure; and (4) synchronization of all adjusted for reducing or increasing drying pressure and time. (Cl. 92-39).—A.P.-C.

Method of Making Strip-Gummed Paper. John S. Gilchrist, assignor to McLaurin-Jones Co. U. S. pat. 2,086,126 (July 6, 1937).—The paper is coated with adhesive on substantially the whole of one side. After drying, spaced apart strips of non-adhesive waterproof material are applied over the gum coating. (Cl. 91-68).—A.P.-C.

Bituminous Mixtures Suitable for Roofing, Battery Boxes, Etc. Thomas Robinson assignor to Lancaster Processes, Inc. U.S. pats. 2,072,686 and 2,072,687 (March 2, 1937). *No. 2,072,686.*—A bituminous binder such as asphalt is used with natural wood fibers distributed substantially uniformly and homogeneously in the form of relatively long individual fibers having a large amount of fibrillae on them, interlaced and coated and bound together by the binder, and with a multivalent alkaline substance, at least partly combined with the lignin of the fibers and forming with it a water-soluble product, such as lime. *No. 2,072,687* relates to a mixture of an aqueous emulsion of bituminous material, mixed with a stabilizer, such as lime, etc., and with paper stock disintegrated to the form of substantially individual fibers, interlaced, coated, and substantially uniformly distributed throughout the emulsion. (Cl. 106-31).—A.P.-C.

Shingle. Frederick C. Young. U. S. pat. 2,073,274 (March 9, 1937).—The invention provides an individual shingle comprising a rectangular body of flexible felt impregnated with asphaltic material and having a continuous butt end. The body has at its lower or butt edge an integral underfolded extension of less width than the width of the shingle and of considerably less length than the butt, so that the remainder of the shingle is flexible and may seek its own level over and uneven roof surface under the action of the sun. The extension is folded under the body, while the body is warm and pliable, and is sealed to the underside of the body by asphaltic material. The top surface of the shingle and under surface of the folded-under extension are covered with granular mineral material and the remainder of the under surface of the body is free of granular material. (Cl. 108-7).—A.P.-C.

Floor Covering. Louis L. Larson and David Lindsay, Jr., assignors to Krafelt Corp. of America. U.S. pat. 2,074,964 (March 23, 1937).—An aqueous emulsion of fatty oil paint is added to an aqueous dispersion of paper pulp which comprises artificially crinkled superficially mercerized fibers. After intimate mixing of the emulsion and pulp, the particles of emulsified paint are precipitated on to the fibers. The mixture is made into sheets, which are then dried, printed with a pattern extending substantially through the sheets with printing paint, and cured. (Cl. 92-21).—A.P.-C.

Insulating Lath Material. Edwin D. Coddington, assignor to Reynolds Metals Co. U.S. pat. 2,071,454 (Feb. 23, 1937).—A plaster base material comprises two sheets of paper, one of which provides a substantially plain flat surface and the other of which is corrugated to provide air cells between the sheets. A coating of bright metallic foil is applied on the faces of the sheets defining the air cells. (Cl. 72-116).—A.P.-C.

Feeding Device for Shingle Cutters. John W. Pearl, assignor to The Barrett Co. U.S. pat. 2,081,280 (May 25, 1937).—The sheet of prepared roofing is fed to the shingle cutter between two series of parallel belts, preferably faced with soft rubber, to prevent slippage. (Cl. 164-68).—A.P.-C.

Method of Preventing Efflorescence on the Surface of Colored Roofing Granules. Paul Teetor, assignor to Central Commercial Co. U.S. pat. 2,081,609 (May 25, 1937).—A small amount of barium carbonate is added to the mix used for coating the granules. (Cl. 91-70).—A.P.-C.

Oil- and Moisture-Proofing Composition and Products Made Therefrom. Robert R. Ferguson, assignor of one-fourth to John G. Graham and one-fourth to Paul V. Rogers. U.S. pat. 2,082,278 (June 1, 1937).—The oil- and moisture-proofing composition consists of a mixture of rubber and hydrogenated animal or vegetable oil (preferably hydrogenated fish oil), which may be used in the form of an aqueous emulsion. (Cl. 154-50).—A.P.-C.

Process of Treating Paper. Thomas Hans. U. S. pat. 2,079,993 (May 11, 1937).—The invention provides a process of treating paper to render it water repellent or water absorbent, as desired. Thirty parts of air-dry chemical pulp, 45 of caustic soda, 300 of water and 90 of tung oil, castor oil, linseed oil, cotton seed oil or soy bean oil are thoroughly mixed, cooled to not over 110 deg. F., 30 parts of carbon disulphide are added, allowed to stand till the fibers substantially disappear (45 min. to 3 hrs.), and mixed with 2700 parts of water. Sheets of unsized or slack sized paper are passed through this solution and through a press and then dried. (Cl. 91-68).—A.P.-C.

Paper Treated with Synthetic Resin. James A. Arvin, assignor to E. I. du Pont de Nemours and Co. U.S. pat. 2,075,333 (March 30, 1937).—Wrapping or wall paper is treated with the resinous reaction product of a substantially unpolymerizable polyhydric phenol such as 4 (4-hydroxyphenyl)—dimethylmethane and organic polyhalide such as B., B′-dichlorodiethyl ether, the halogen atoms of which

are all attached to different carbon atoms and the carbon atoms of which are joined to other atoms by single bonds only. (Cl. 91-68).—A.P.-C.

Washable Papers. Robert A. Voet, assignor to United Wall Paper Factories Inc. U.S. pat. 2,079,780 (May 11, 1937).—In the production of coated or like papers containing casein or other protein, the latter is set or hardened by means of a solution containing formic acid combined with an alkaline reacting metal or metalloid, such as aluminum, sodium, potassium, calcium, magnesium, barium or ammonium, the solution being made acid (pH 4.8 to 5.5) by means of sulphuric acid or an acid-reacting sulphate. (Cl. 91-67.9).—A.P.-C.

Waterproof Match Card. Thomas L. Cunningham, assignor to Drigard Products Corp. U. S. pat. 2,072,097 (March 2, 1937).—Waterproof paper matches are impregnated by thinly coating with a waterproofing composition comprising a water-insoluble aluminum soap, hydrogenated fish oil and rubber, and are provided with a cover of paper also treated with waterproofing composition, the latter being so thinly applied that it is broken down by the friction or pressure normally applied when striking a match. (Cl. 44-42).—A.P.-C.

Laminated Insulation Material. Omar H. Smith, assignor to United States Rubber Co. U.S. pat. 2,078,422 (April 27, 1937).—Sheets of paper or other suitable fibrous materials are impregnated with a solution of metastyrol (polymerized styrol) in an organic solvent, and after drying, the sheets are piled up in the desired number and pressed under heat to consolidate the sheets. (Cl. 154-2.6).—A.P.-C.

Fireproofing Materials Such as Paper Wire Coverings. Rudolf Engelhardt, assignor to I. G. Farbenindustrie A.G. U.S. pat. 2,073,004 (March 9, 1937).—The material is impregnated with a mixture of about 70 to 95 parts of wax-like chlorinated naphthalenes or chlorinated biphenols and 30 to 5 parts of chlorinated rubber or polyvinyl chloride. (Cl. 91-68).—A.P.-C.

Multiply Latex-Treated Paper. Ferdinand W. Humphner, assignor to Mid-States Gummed Paper Co. U.S. pat. 2,077,998 (April 20, 1937.)—A strip of unsized absorbent paper is impregnated with a latex composition, a strip of sized paper is applied to one or both sides of the impregnated strips and combined therewith by pressure, and a coating of glue or other adhesive is applied to the exposed face of the sized strip (or of one of the sized strips if two were used) to obtain a strong, flexible, adhesive tape. (Cl. 154-43).—A.P.-C.

Apparatus for Manufacturing Saturated Sheeted Fibrous Structures. Izador J. Novak, assignor to Raybestos-Manhattan, Inc. U. S. pat. 2,078,272 (April 27, 1937).—A newly formed wet web of sufficient consistency to be self-sustaining is transferred from the forming wire to an open-mesh wire which carries it through a suitable impregnating bath. (Cl. 92-40).—A.P.-C.

Fiber Composition and Method of Making the Same. Steven Wilson, assignor of 37.5% to Thurlow W. Gregory and 25% to William J. Wesseler. U.S. pat. 2,075,768 (March 30, 1937).—Articles with elements having germicidal characteristics effective upon superficial bacteria and acting also as a preservative for the binder, are formed by intermixing dry water-soluble germicidal elements into dry fibers as a cold process, separately mixing animal glue with water and potassium bichromate to form a stringy mass, adding the latter as a binder to the fibrous mixture, mixing the whole while substantially dry into a plastic mass, and pressing it into the desired form of articles. The material can be used for dental equipment and hospital equipment of all kinds. (Cl. 167-13).—A.P.-C.

Method and Apparatus for Manufacturing Absorbent Pads. Harrison R. Williams. U. S. pat. 2,086,757 (July 13, 1937).—Wood pulp is fed continuously into a bicameral receptacle from which it is withdrawn in the form of two vertically spaced loosely felted webs. "Circumfusing" material is applied to the upper face of the lower web, and the two webs are superposed to form a duplex web of absorbent pad material. One face of a sheet of cellulose is subjected to a wasteproofing treatment (e.g., with paraffin) and is combined (alone or with other cellulosic sheets) with the duplex web above referred to. The combined web is severed into portions which are wrapped in suitable gauze material. (Cl. 154-52).—A.P.-C.

Manufacture of Artificial Leather. N. Strachovsky. Brit. pat. 461,558 (July 10, 1935).—A thin sheet of fibrous material, mixed with plaster of Paris or Portland cement to absorb liquid, is impregnated with an aqueous dispersion of rubber containing not more than 5 per cent of a rubber solvent (petrol), a rosin-ammonia soap, ammonia to give a pH not less than 6.8, and sodium silicate to assist jelling.—A.P.-C.

Impregnating Paper or Cardboard. Société de-Etudes el d'Inventions. Fr. pat. 805,623 (Nov. 25, 1936).—Greaseproof packing paper or cardboard is made by the application of a thin coating of latex and then a coating of animal, vegetable or mineral wax, or the paper or cardboard contains latex and the wax is applied to the finished article.—A.P.-C.

Manufacture of Building Plates from Sisal Waste. E. H. Schwencke. Brit. pat. 463,927, (Oct. 7, 1936).—The fleshy leafy matter is removed, organic acids are neutralized, and the mass is mixed with magnesia, magnesium sulphate, and a filler, and pressed or rolled. Bituminous matter may be present.—A.P.-C.

Finishing Composite Paper Sheet Material. George E. Gibbs, assignor to American Re-Enforced Paper Co. Can. pat. 366,486 (June 1, 1937).—Paper layers united by hot asphalt are finished by moistening one of the layers and winding the composite sheet into a roll with the moistened paper layer of one wind in contact with the unmoistened paper layer of the next adjacent wind.—A.P.-C.

Building Strip and Construction. Eli L. Chamberlain, assignor to The Patent and Licensing Corp. U.S. pat. 2,085,899 (July 6, 1937).—A strip of asphalt-saturated felt base is surfaced with slate of a given color. Additional and discontinuous spaced parallel strips of crushed slate of contrasting shade applied along one edge of the strip so as to expose horizontal lines of the first slate surfacing. The lower of the strips is divided into brick-simulating elements by means of vertical notches, and the remaining strips are similarly divided by means of vertical holes. The strips are provided with diagonally opposed notches or offsets which provide a means for offsetting the joints of adjacent elements in the same course from the holes in an overlying course. (Cl. 20-5).—A.P.-C.

Ornamental Wallboard for Outside Weather-proofing. Leslie S. Odell, assignor to Bird & Son, Inc. U.S. pat. 2,085,764 (July 6, 1937).—A siding panel comprises a rigid fiber board base with a superstructure of asphaltic roofing secured to one face. The side edges of the superstructure are serrated to represent the staggered ends of courses of bricks. The superstructure is offset with respect to the fiber board so that the lower edge and an entire side edge of the superstructure are outside the contour of the board. (Cl. 20-5).—A.P.-C.

Sound-Absorbing Structure and Material. Theodore M. Prudden. U.S. pat. 2,086,433 (July 6, 1937).—This is an improvement on Prudden's U.S. pat. 2,060,241, of Nov. 10, 1936. A series of sheets composed of loosely felted fibers having one smooth face and loose fibers upstanding from the other face, are combined so that the smooth face of one sheet is in contact with the upstanding-fiber face of the adjacent sheet. (Cl. 154-44).—A.P.-C.

Wallboard. John Fletcher, assignor to Plastergon Wall Board Co. U.S. pat. 2,086,862 (July 13, 1937).—A sheet of open-pore fiber insulating board is impregnated with a suitable stiffening agent (preferably by applying a solution of resin in a volatile solvent), and a plastic coating containing calcined gypsum and an adhesive is applied on the face of the impregnated fiber board. (Cl. 91-68).—A.P.-C.

Flexible Wallboard. John C. MacIldowie, assignor to Johns-Manville Corp. U.S. pat. 2,080,285 (May 11, 1937).—An asbestos-cement suspension is sheeted on a wet-machine type of board machine. The sheet is placed on a rigid plate and covered with a wire screen, a suitable number of such assemblies are stacked and subjected to pressure of the order of 3000 lb. per sq. in. for about 10 min. The sheets are separated from the rigid sheets and screens and allowed to harden giving a strong, flexible board. (Cl. 92-61).—A.P.-C.

Ribbed Board. George A. Buttress. U. S. pat. 2,077,513 (April 20, 1937).—A facing sheet of fiber board formed with spaced hollow ribs is covered with a backing sheet. The ribbed board comprises a number of plies embodying an absorptive surface sheet and an underlying moisture resistant sheet. The ribs and the intervening grooves are of dove-tailed cross section, and channelled reinforcing strips are arranged inside the ribs and bear against the ribs throughout; the reinforcing strips have longtiudinal folds bearing at their edges against the backing sheet. (Cl. 72-116).—A.P.-C.

Artificial Lumber. James V. Nevin. U. S. pat. 2,078,269 (April 27, 1937).—The finished product comprises 70 to 95 per cent of wood, having its fibers impregnated with and bonded together by from 5 to 30 per cent of an infusible binder composed of the reaction product of urea, meta-cresylic acid, formaldehyde and the natural binders present in the wood. (Cl. 92-21).—A.P.-C.

Thermal Conductivity of Kaoliang Board. T. Y. Chang, K. J. Chen and C. L. Yin. Sci. Rep. Nat. Tsing Hua Univ. 3: 539-544 (1936).—The conductivity of board made from kaoliang stalks is less than that of asbestos, straw pulp, and celotex board and is about 3.8 x 10^{-4} g.-calories per sq. cm. per sec. for a temperature gradient of 1 deg. C. per cm.—A.P.-C.

Fiberboard. James N. Devereux, assignor to United States Gypsum Co. U.S. pat. 2,080,031 (May 11, 1937).—A watery mixture of coarse and fine fibers is agitated and aerated, with an admixture of sizing materials such as alum and rosin. The result of such agitation and aeration is to float to the surface of the mixture the fine fibers and the products of the reaction between the size and the natural hardness or chemicals of the water. As the board is formed the foam is killed in such a manner as to deposit the foam-carried products on the surface thereof, forming a tough smooth skin in which is concentrated the fine fibers and precipitated products. (Cl. 92-3).—A.P.-C.

Process for the Preparation of Multiple Layered Paper. W. Stegemann. Bautzen. Ger. pat. 640,666 (May 27, 1934).—To manufacture a multiple layered sheet of paper without pasting, one or two sheets of finished absorptive paper is moistened and joined to a sheet leaving the wire.—J.F.O.

Calendering Parchment Paper. Schagen. Wochbl. Papierfabr. 67, No. 17: 315-18 (April 24, 1937).—The author discusses the following points concerning calendering; pressure, temperature, friction and the regulation of the moisture.—J.F.O.

Old Papers Containing Asphalt. Fritz Hoyer. Wochbl. Papierfabr. 68, No. 18:337-39 (May 1, 1937).—The methods for the production of tar paper, asphalt paper and bitumin paper are briefly described. The re-working of asphalt paper takes place in a cooker where it is treated with hot water, then drained and put in a kollergang with 3 to 5 per cent of a cheap talc, and the product herefrom is put in the beaters and processed as ordinary paper.—J.F.O.

Manufacture of Water-proof and Grease-proof Wrapping Paper. O. Bauer. Zellstoff u. Papier 17, No. 4: 159-62 (April, 1937).—By reference to numerous patents, the author briefly describes or mentions a great many substances used for making water-proof and grease-proof wrapping paper. These materials are divided into three main groups; those which are added direct to the beater, impregnation and coating.—J.F.O.

Process for the Manufacture of a Vulcanized Fibre of Good Water Resistance and Good Mechanical Properties by the Use of Artificial Resins. Gesellschaft fur Chemische Industrie in Basel, Switzerland. Aust. pat. 146,821 (April 15, 1936).—An amino formaldehyde resin is used which is thermoplastic.—J.F.O.

Asbestos in Paper and Board. P. Goldsmid. Papier 40: 413-415 (May, 1937).—A brief outline of the properties of asbestos and of its use in the paper making industry, together with a description of its determination in paper.—A.P.-C.

Reflection of Ultra-Violet Light by Papers and Its Future Possibilities. Maurice Déribéré. Papier 40: 303-306 (April, 1937).—A brief discussion of the possibilities of utilizing the ultra-violet light reflection properties of paper stocks and pigments in the manufacture of wall papers to meet present-day lighting-effect requirements in competition with paints and varnishes.—A.P.-C.

Complementary Notes on Fluorescence. Maurice Déribéré. Papeterie 59: 369 (April 25, 1937).—When papers are rendered fluorescent by means of organic salts or dyestuffs, it frequently happens that the fluorescence is not permanent. This is due to the fact that optimum fluorescence is obtained with maximum purity of the dye, which corresponds to minimum light-fastness of the color. Considerable

improvement in the fastness of the fluorescence is obtained by adding a small amount of pulverized wool or silk to the stock.—A.P.-C.

The Strength Properties of German Cellulose Wool. H. Schlenker. Papier-Fabr. 35, No. 9: 70-72; No. 10: 80-82 (Feb. 26, March 5, 1937).—The following topics are discussed: the meaning of cellulose wool, influence of the most important properties of cellulose wool on its processing such as, fiber fineness, staple, spinning structure, strength properties on the spinnability of the fiber and the use properties of the finished product, relation of the tensile strength properties on the construction of the fiber, influence of the moisture content and the swelling capacity, and strength and stretch values for the commercial kinds of cellulose wool.—J.F.O.

Method for the Preparation of a Superficially Rougher De-Watering Cloth Impregnated with a Fiber Protective Means; Especially for Paper and Board Machines. J. Weckmuller, Bad Godesberg. Ger. pat. 640,184 (Sept. 3, 1935).—The starting product is coated on one side with a material which can be washed away readily; the product is then impregnated with a fiber protective means, caoutchouc, so that this penetrates through one quarter of the thickness of the sheet. The coating is then washed away and the rubber vulcanized.—J.F.O.

Permanency

Technical Status of Permanence and Durability of Paper. M. S. Kantrowitz and R. H. Simmonds. Proc. Graphic Arts Tech. Conference, 1936:3-7; Bull. Inst. Paper Chem. 7:338.—The authors review the present knowledge of the factors influencing the endurance of paper. Reference is made to chemical and physical tests, including accelerated aging tests and their possible reliability for forecasting the probable longevity of a given paper. The opinions of different investigators vary with regard to the value of such tests. The permanence of paper must not be confined to its quality alone; storage conditions must also be considered. In conclusion, a brief description of Government specifications for permanent papers is given.—C.J.W.

Effect of Fiber Components on Stability of Book Papers. M. B. Shaw and M. J. O'Leary. J. Res. Nat. Bur. Stand. 17: 859-869 (1936).—Tests were made on unsized paper (free from alum) made from wood pulp, soda and sulphite pulps, and new and old rags. Stability, cellulose content and copper number were closely related; the alpha-cellulose content was 78 to 93 per cent and the copper number 3.8 to 0.4. The sulphite and soda pulps gave less stable papers than the purer fibers.—A.P.-C.

The Discoloration of Wood Pulp by Light and Heat. S. R. H. Edge and Helen M. McKenzie. World's Paper Trade Rev. 107: 100, 102, 140-146, 179-182 (Jan. 8, 15, 1937); Paper Maker 93: TS32, 35-36, 34, 55-57 (Feb., March, April, 1937); Proc. Tech. Sect., Paper Makers' Assoc. 17: 437-451 (1937).—Color measurements were made by the Blancometer. Bleached sulphite pulps when exposed to sunlight first exhibit rapid and appreciable yellowing, followed by a whitening effect which takes place much more slowly and probably indicates the bleaching of residues not removed by the normal bleaching process. The effect of heat at Cairo shows some similarity with that of moist heat at 30 deg. C. There is no relation between the results of exposure to sunlight and to ultra-violet light; this is true in the case of both pulp and paper. A short exposure to arc light produces in 1 or 2 cases a result resembling the initial dulling with sunlight, but there is never any production of the whitening produced by long exposure to sunlight; longer exposures to arc light merely causes an accumulation of the yellow effect. While fluorescence test grades the pulps, it is not clear as to which of the tests this grading resembles, which may be due to the paucity of the results and to the fact that the results were expressed in word rather than numerically.—A.P.-C.

Preservation of Records. A. E. Kimberly and B. W. Scribner. U.S. Bur. Stand. Misc. Publ. M154. 28 pp. (March, 1937).—Storage conditions in variously situated libraries, the effects on paper of light and sulphur dioxide pollution of the air, and damage arising from the presence of dust and excess moisture in the air due to inadequate ventilation are surveyed In a study of old papers, those having the highest alpha-cellulose contents, whether rag or wood, were the most permanent, and excess of both alum and resin seemed to be followed by marked deterioration; writing ink containing hydrochloric acid, ferrous sulphate, gallic and tannic acids accelerated the aging of paper, and a harmless preparation from ammonium "oxyferrigallate" is recommended. Motion-picture reproduction of records on cellulose acetate films is satisfactory if they are used and stored properly; in addition, the coating of records with cellulose acetate foil shows promise both as regards permanency and because it does not appreciably increase storage space. Recommended practices are recapitulated, the optimum atmospheric conditions for storage being given as 45 to 55 per cent relative humidity and 21 deg. to 27 deg. C.—A.P.-C.

Absolutely Fast to Light. O. T. Chalon and F. A. Soderberg. Tech. Assoc. Papers 20: 248-250 (June, 1937); Paper Trade J. 105, No. 10: 46-48 (Sept. 2, 1937).—Convincing evidence is presented to prove that, so far as the paper industry is concerned, the term "absolutely fast to light" is a misnomer, that the consumer should not insist upon resistance to fading in excess of the true requirements of the finished product, and that some definite step should be taken whereby a standard method of testing can be evolved.—A.P.-C.

Report of Permanence and Durability Committee. F. C. Clark et al. Tech. Assoc. Papers 20: 296-298 (June, 1937); Paper Trade J. 105, No. 9: 42-44 (Aug. 26, 1937).—A comprehensive program for the study of the performance of paper is presented for consideration.—A.P.-C.

The Aging of Paper. Wochbl. Papierfabr. 68, No. 16: 299-300 (April 17, 1937).—Bible paper was once aged for six months, but with the machinery now on the market for aging or regulating the moisture content of paper this can be done in a very short time and gives the paper any moisture content desired. The troubles encountered from paper with the wrong moisture content and the description of the machinery are discussed.—J.F.O.

Printer and Paper

Register and Air Conditioning. J. F. Springer. Nat. Lithographer 44, no. 7:18-19, 65-66 (July, 1937); Bull. Inst. Paper Chem. 7, 428.—The author gives popular explanation of the relationship between humidity and stretch or shrinkage of paper

and emphasizes the importance of proper air conditioning and maturing of paper.—C.J.W.

The Responsible Man in Charge of the Paper Store Room. Mahoe. Papier-Ztg. 62, no. 32:553-554 (April 21, 1937); Bull. Inst. Paper Chem. 7:344.—Directions are given for the correct handling and storing of paper prior to printing. Too dry and too moist rooms are equally bad. Stored paper should always lie flat and touch neither floor nor walls. There should always be a sufficient space provided to allow free air circulation from all sides. The machine direction should be clearly indicated on all packages.—C.J.W.

Newsprint Viewed from the Buyer's Angle. Papir-J. 25, no. 8: 102-110, 112-116, 118-120 (April 30, 1937); Bull. Inst. Paper Chem. 7:383.—The technique of printing developed to a great extent during the last 25 years on account of the high demands placed upon general make-up and composition and increase of speed. The manufacture of newsprint made similar strides. The cooperation between printer and newsprint manufacturer, however, has been slight during all these years. Newsprint should absorb the printing ink without showing signs of strike-through. The absorption of the printing ink depends upon the volumetric composition of the paper, its surface and moisture content, as well as upon the printing rate. The most important demand which the printer places upon his paper is that it permits a safe operation, in other words, it should be uniform, shipped and handled in a careful manner, and possess the correct flexibility or strength properties. A suitable surface and adequate absorptiveness are other requirements. The methods by which the strength of paper is tested in the mill do not express its suitability for printing purposes. A printer calls good paper "soft" and bad paper "hard." The printability of paper is best evaluated by printing of samples before the actual run is started.—C.J.W.

How Much a Pound? Wm. B. Wheelwright. Paper and Printing Digest, (May, 1937):12-13; Bull. Inst. Paper Chem. 7:353.—Paper should not be evaluated and sold by "how much a pound," but according to "value added by manufacture." This factor will be determined by the skill of the craftsmen who convert the paper into a finished product; one paper maker will make a better sheet out of approximately the same raw materials than another, and one printer, using the same type faces, paper, and inks, will do a better job than another following identical specifications.—C.J.W.

Who Should Specify the Paper? Wm. B. Wheelwright. Paper and Printing Digest, (June, 1937):10-11; Bull. Inst. Paper Chem. 7:353.—The author differentiates between papers to be used strictly as printed matter, and papers which, although carrying a certain amount of printing or ruling, are actually to be used for some business purpose, such as letter heads, order forms, tags, etc. In the first case, the job as it leaves the printer is practically completed save for distribution; if all requirements have been fully stated by the patron, the printer is in the best position to specify the most satisfactory brand of paper to be used. However, if after the job has been delivered by the printer, it has to be put to other specific uses by the customer, it is usually better to encourage the customer to specify the paper, because regardless of how well the mere printing looks, the way it functions is what counts. The printer who specifies the stock for this type of work assumes the responsibility both for how it will look and work.—C.J.W.

Why Not Select the Right Paper? Bernard Stroulger. British Printer 49, no. 294:299-300 (May, 1937); Bull. Inst. Paper Chem. 7:353.—The author discusses the suitability and shortcomings of different printing papers and their surfaces for various applications. He covers coated papers, imitation art papers, cartridge printing papers, hand made and mold made printing papers, writing papers, boards, metallic papers and boards, and certain finishing operations of the printed matter, such as embossing and spraying with cellulose dope.—C.J.W.

Printing Ink as a Dynamic System. R. F. Bowles. Paper Maker 93: TS70-79 (May, 1937).—A discussion of the constitution, properties and use qualities of printing ink (more particularly a typical flat-bed ink of very simple composition).—A.P.-C.

Pulps

Pectins in Sulphite Pulp. Otto Wurz. Papier-Fabr. 34, no. 22:185-187 (May 28, 1937); B.I.P.C. 8:389.—Wurz gives further evidence of the presence of pectin in wood and pulp. In order to determine that lignin does not interfere with the Ruthenium Red staining test developed by the author for detecting pectin, he made comparative experiments with Malachite Green and Ruthenium Red stains on wood, lignin, and various pulp samples. The tabulated data indicate that lignin does not impair the Ruthenium color reactions. A number of chemical reactions are described which confirm the presence of pectins in wood and pulp. Contrary to the general belief that pectins are the more readily soluble of all substances of the cell wall, the author substantiates Ehrlich's theory that very resistant pectins are present in the form of a water-insoluble calcium salt of pectolic acid (tetragalacturonic acid).—C.J.W.

Can Cotton Entirely Replace Wood Pulp in the Viscose Rayon Industry? Rayon Textile Monthly 18, no. 9: 593-4 (September, 1937); B.I.P.C. 8: 79.—The problem discussed in this article is why the United States, as a cotton growing country, is not using more cotton linters for the manufacture of viscose rayon. While it is quite possible to prepare filaments utilizing cotton cellulose exclusively, the operating processes are more expensive; the filaments, while of a higher dry and wet strength, yield however a more wiry and harsh product with a lack in resilience and elasticity causing a high percentage of fiber breakage. Since rayon from 100 per cent wood cellulose is a soft and weak product from the tensile viewpoint, a certain amount of cotton is added. At the present time preference is given to a mixture of 70 per cent wood cellulose and 30 per cent cotton.—C.J.W.

Purification of Raw Cellulose for Rayon. H. Roche. Silk and Rayon 11, no. 9:842, 862 (Sept., 1937); B.I.P.C. 8:80.—A brief review is given of the organic and inorganic chemical agents which are employed for purifying cellulose from cotton linters, wood pulp, and straw for the manufacture of rayon, with special reference to cellulose acetate.—C.J.W.

Progress in Rayon Pulp Manufacture. C. L. Moore. Rayon Textile Monthly 18, no. 9: 590-2; no. 10: 694-6 (September, October, 1937); B.I.P.C.

8: 115.—The author describes the different operations involved in preparing spruce sulphite for rayon manufacture, from the logging operations to the point where the baled sulphite laps are ready for shipment. The chief requirements of the rayon manufacturer are purity and uniformity of pulp. A sufficient supply of process water of low hardness is essential in the further converting processes. Reference is made to the important chemical and physical tests of the pulp and the necessity of strict scientific control throughout the pulping procedure. The advantages of a small scale viscose producing and spinning plant are outlined, as well as the importance of a detailed system of filing, where each bale carries a serial number, indicating its physical and chemical properties, a complete record of its treatment, etc. —C.J.W.

Cooking of Viscose Pulp. Zellstoff u. Papier 17, No. 7: 289-92 (July, 1937).—The specification of a standard viscose pulp are given and a short discussion of same. Then a whole mass of data is presented in table form and discussed in detail. Cooks were made with strong and weak acids, according to various processes, and with various cooking charts and the results of tests on the finished pulp presented.—J.F.O.

Cellulose Pulping System and Product Thereof. Frederich Olsen, assignor to The Cellulose Research Corp. U. S. pat. 2,087,263 (July 20, 1937).—In order to obtain from purified wood pulp cellulose derivatives equal to those obtained from cotton, drying of the pulp is prevented so as to avoid irreversible changes in the gel structure. The moisture content is not allowed to fall below 20 per cent and is preferably maintained at about 50 per cent. Prior to esterification, (e.g., acetylation) the water is displaced by repeatedly treating with a suitable reagent (eg., glacial acetic acid) and pressing. (Cl. 260-101).—A. P.-C.

Wood-Treating Device. Otto R. Hellborg and Gunnar A. Nyberg. U. S. pat. 2,083,445 (June 8, 1937).—Wood to be pulped is passed continuously or discontinuously through a long chamber to a part of which (lying between the ends) hot water or steam is supplied, partly to raise the wood to the desired temperature and partly to make up for heat losses. Spraying devices are provided in the upper part of the chamber, and collecting tanks or trays below the respective sprays, and the liquid from each collecting tank is fed to the next succeeding spray towards the inlet end of the chamber. (Cl. 144-208).—A.P.-C.

Treating Cellulose Fibers. I. G. Farbenindustrie A.-G. Fr. pat. 806,170. (Dec. 9, 1936).—Cellulose fibers are rendered hydrophobic by incorporating with the fibers compounds which contain at least one aliphatic or cycloaliphatic group of 4 or more carbon atoms and capable of reacting with aldehydes, if desired in the presence of a compound of acid reaction, afterwards treating the fibers with aliphatic aldehydes and heating. Aliphatic compounds used include dodecylamine, hexadecylamine, lauric acid amide, methylamide of stearic acid, substituted ureas, *p*-dodecylphenol, di-isohexylphenol and 2, 4-diamino-6-octadecylamino-1, 3, 5-triazine.—A. P.-C.

Purifying Chemical Wood Pulp. Canadian International Paper Co. Fr. pat. 807,159.—The pulp at high consistency is subjected to a hot alkaline treatment in presence of a suitable reagent (e.g., Turkey red oil) which lowers considerably the surface tension of the alkali solution. Alternatively, the pulp at low consistency is treated in the cold with an alkali solution containing a surface-tension-reducing reagent, is dewatered to a consistency of about 30 per cent, and heated to about 65 deg. C. In both cases, after treatment the pulp is thoroughly washed.—A.P.-C.

Purifying Woodpulp. A. H. Stevens assignee of Canadian International Paper Co. Brit. pat. 462,-871 (May 9, 1936).—Alkaline-earth metal salts are removed from sulphite pulp by treating it with 2 per cent of either aqueous or gaseous chlorine and 2.5 per cent of sodium or potassium chloride, and washing with soft water. It is claimed that the lime content is reduced to 0.012 per cent and the magnesia content to 0.005 per cent.—A. P.-C.

High Quality Products from Cellulose. E. B. F. Sunesson. U. S. pat. 2,083,280 (June 8, 1937).—Pulp produced by an alkaline process is treated with an oxidizing agent in quantity up to 60 per cent of the quantity of bleaching agent required for complete bleaching, and then, with or without washing, with a chlorinating agent in quantity corresponding to the chlorine-absorption capacity of the pulp. The reaction products are removed by a suitable washing process. The pulp is treated with a bleaching agent that is mainly oxidizing, with alkali up to mercerizing strength and finally with acid. The mercerizing-alkali treatment may be carried out prior to bleaching or to chlorination. The process gives a very white pulp with high alpha-cellulose content. (Cl. 8-2).—A.P.-C.

Method of Modifying Chemical Pulp. Isador J. Novak and Albert L. Clapp, assignors to Raybestos-Manhattan Inc. U. S. pat. 2,083,575 (June 15, 1937).—Pulp sheets are soaked at room temperature in a mercerizing solution (15 per cent to 20 per cent causic soda) until completely saturated, and the excess caustic liquor is removed by pressing. Pulp treated in this way produces a very soft, open, absorbent paper. (Cl. 9-13).—A. P.-C.

Advances Made in the Manufacture of Wood Cellulose of High Purity and Its Expanding Use for Rayon, Cellophane, Plastics, Etc. R. S. Hatch. Pacific Pulp Paper Ind. 11, No. 7: 17-19 (July, 1937); Paper Trade J. 105, No. 4: 28-29 (July 22, 1937).—A brief review.—A.P.-C.

Treating Crude Pulp. Fritz Offermanns. Fr. pat. 807,215 (Jan. 7, 1937)—The material is compressed in a press, impregnated under a pressure of 6 to 12 atmospheres by an acid or salt liquor at 150 deg. to 220 deg. C., then the fibers are dissociated and driven continuously under pressure into screw presses or washing vessels.—A. P.-C.

Pulps—Washing

Washing of Bleached Sulphite Pulp. N. W. Coster. Pacific Pulp Paper Ind. 11, No. 2: 20-21 (Feb., 1937).—The design and operation of vacuum pulp washers are briefly described and data are presented on their performance in the washing of sulphite pulp.—A.P.-C.

Pulp Washing By Diffusers. Rex Russell, Pacific Pulp Paper Ind. 11, No. 2: 21 (Feb., 1937).—A brief description of pulp diffusers and their operation, with a discussion of factors to be considered in order to obtain efficient operation.—A.P.-C.

Modern Method of Washing Kraft Brown Stock. C. Fuhrmeister. Paper Mill 60, No. 28: 11-13, 19 (July 10, 1937).—A discussion of the merits of the Oliver-Young continuous vacuum filter for the washing of kraft brown stock.—A.P.-C.

Concentration and Filtration in the Pulp and Paper Industry. R. J. Venn. World's Paper Trade Rev., Tech. Conv. No.: 73-91 (March, 1937).—A description and discussion of the principle, construction, operation and performance of rotary drum filters, and of their application as thickeners and washers in the pulp industry.—A. P.-C.

Raw Materials

Quality of Rapid- and Slow-growing Pine for Producing Sulphate Pulp. O. Routala, Klaus Linkola and Oiva Poelkkynen. Suomen Kemistilehti 10A:1-2, 17-19 (1937); C. A. 31:4113.—The slow-growing pine of north Finland gives as high a yield of sulphite pulps as the faster-growing pines of the south. The former showed greater breaking length and bursting surface and less resistance to tearing. The fiber length of the pulp was greater, it had better porosity number and gave a firmer paper than pulp of the faster growing wood with equal grinding. These differences were especially evident for slightly bleached sulphate cellulose. The longer fibers of the slow-growing wood were less affected by alkalies.—C.J.W.

Report of a Survey Made in Different Sections of Sweden in Connection with Practical and Scientific Investigations for Improving the Quality of the Growth in Forestry Practice. H. Hesselman and N. Sylvén. Svensk Pappers-Tidn. 40, no. 13: 299-307; no. 14:324-335 (July 15, 31, 1937).—The profusely illustrated report summarizes the findings of a survey of the growth factors of the commercially important species of pine, spruce, birch and aspen in different provinces of Sweden.—C.J.W.

Most Important Properties for Characterizing the Quality of Pulp Wood. Th. Wegelius. Finnish Paper and Timber J. 19, no. 7A:354 (356-358, 360, 362 (April, 1937); Bull. Inst. Paper Chem. 7:444.—The properties of wood which influence its suitability as a raw material in the paper industry are partly anatomical-structural physical and chemical, partly physico-chemical or of a mechanical technical nature. The author discusses, in detail, each important property and its effects on the paper making process, with reference to the work of other investigators.—C.J.W.

Cut Blocks or Logs. Nils N. Ihlen. Papir-J. 25, no. 7:75-78 (April 15, 1937).—A polemic against the article of J. K. Sandmo.—C.J.W.

Felling of Pulp Wood During the Period of Sap Flow. Harald Gaalaas. Papir-J. no. 10:155-158; no. 11:170-173 (May 31, June 15, 1937); Bull. Inst. Paper Chem. 7:414.—The article discusses the advantages and drawbacks of felling timber during the period of sap flow from the angle of forestry, economic and labor conditions, quality and transportation.—C.J.W.

Improving Tree Quality Through Correct Forest Management. Nils Sylven. Svensk Pappers-Tidn. 40, no. 7:154-161 (April 15, 1937); Bull. Inst. Paper Chem. 40, no. 7:154-161 (April 15, 1937); Bull. Inst. Paper Chem. 7:332.—The author outlines the important factors which should govern the Swedish forest policy with regard to improvement of wood quality and guarantee of sustained yield.—C.J.W.

Wood As Raw Material in Chemical Technology. G. Schneider. Chem.-Ztg. 61, no. 46:473-476 (June 9, 1937); Bull Inst. Paper Chem. 7:436.—Among the topics discussed are pulp manufacture, the utilization of sulphite waste liquors, tanning extracts, recovery of rosin, etc.—C.J.W.

Contribution to the Study of the Wood of Pachylobus. Buttneri. Adrien Albarranc. Non. papeterie française 74: 169-171, 185-187 (April 1, 15, 1937).—The composition of the wood on the dry basis (7.8 per cent moisture) was as follows: ash 0.40 per cent, oleoresins and waxes 2.90 per cent, lignin 28.60 per cent, cellulose 52.17 per cent, pentosans 15.83 per cent, nitrogen 0.04 per cent, cold water-soluble 1.62 per cent, hot water-soluble 5.36 per cent, soluble in 1 per cent caustic soda 13.61 per cent. Pulp obtained by cooking for 4 hrs. at 175° C. with an 11° Bé. caustic soda solution (25 per cent sodium hydroxide on the weight of the wood) contained: (1) fibers 0.3 to 1.4 mm. long with a maximum diameter of 0.030 to 0.035 mm.; (2) numerous voluminous, thin-walled, ungrated vessels, 0.100 to 0.350 mm. in diameter; (3) medullary rays and (4) parenchymatous cells, both filled with a resinous and tannoid substance. The Cross and Bevan cellulose contains considerable pentosans. The 1 per cent caustic soda soluble consists of beta- and gamma-cellulose, other hemicelluloses, pentosans and lignin. In the course of treatment of the wood with sodium bisulphite the ash content of the fibrous residue rises to a maximum (about 1.5 per cent) and falls to a constant value (about 0.75 per cent). Lignin obtained by treatment of the wood with 72 per cent sulphuric acid contains no pentosans.—A.P. OC.

The Small Timber Utilization Problem. Adalbert Ebner. Pulp Paper Mag. Can. 38: 573-583, 640, 642 (July, Aug., 1937).—An analysis of the situation in Germany.—A.P.-C.

Celluloses. II. Analysis of Larches from Honshu, Korea and Hokkaido. T. Ito. **III. Analysis of Cellulose Woods: Spruce and Fir from Manchukuo.** T. Ito. and Y. Fukuda. J. Cellulose Inst. Tokyo 13: 4-5, 5-6 (1937).—Tables of analytical data are given.—A.P.-C.

Wood Substances. VI. Use of Wood Thinnings for Cellulose Preparations and Their Fundamental Investigation Along and Across the Fiber. I. K. Nishida and M. Otani. J. Cellulose Inst., Tokyo 13: 48-52 (1937).—The lengths and widths of fibers from thinnings of various species are recorded; the data indicate that such wood, especially from pines, is suitable for paper manufacture.

Chemical Composition of Wood. William G. Van Beckum and George J. Ritter. Paper TradeJ. 104, No. 19: 49-50 (May 13, 1937).—A procedure for determining holocellulose has been devised in which extractive-free wood sawdust is alternately treated with chlorine gas and a solution of hot 95 per cent alcohol containing 3 per cent monoethanolamine. The time required for the determination is reduced from 2 days to less than 3 hrs. No chemicals with offensive odors are employed and a rather sharp color end point is obtained when the last trace of lignin is removed from the holocellulose. The remainder obtained when the holocellulose is subtracted from 100 checks within a few 0.1 per cent

with that of the lignin content obtained by the actual lignin determination.—A.P.C.

Sources of Cellulose. V. Alpha-Cellulose Contents of Various Pulp Plants. K. Shimbo. J. Agr. Chem. Soc. Japan 13: 185-190 (1937).—Data are given for the amounts of total cellulose, alpha-, beta- and gamma-cellulose, and ash in pulps from various soft and hard woods, and talks of agricultural plants. Relative viscosity values are also given. —A.P.-C.

Wood As a Raw Material for Chemical Commodities, Including Chemical Pulp, Plastics, Wall Board, Explosives. L. F. Livingston. Pacific Pulp Paper Ind. 11, No. 4: 22-24 (April, 1937).—A general discussion.—A.P.-C.

Concerning the Study of Wood. N. J. Sundstedt. Zellstoff U. Papier 17, No. 6; 229-33 (June, 1937).

Experiments were made on wood that had been subjected to different conditions previous to chipping; the wood was then chipped, cooked and tests made on the finished pulp. A layer of undecomposable wood is formed in the spruce wood when it is kept under water with its bark intact, the formation of this layer is dependent on the temperature of the water. An undecomposable layer is also formed if wood barked in the forest is stored under water for a long period. This layer contains high quantities of extract, and the penetration of the cell wall is changed so that decomposition is impossible. Color tests show that this layer contains resin and tannin. —J.F.O.

Searching for Pulp Woods. Wochbl. Papier fabr. 68, No. 21; 399 (May 22, 1937).

A brief discussion of the search by the various European countries of new sources of pulp wood. Bamboo and Australian woods, the Japanese dependence of an outside source of pulp wood are mentioned.—J.F.O.

Use of Bagasse as Cellulosic Raw Material. Camillo Levi and Emilio Debenedetti. Ind. carta 4, no. 5:171-177 (May, 1937); Bull. Inst. Paper Chem. 7:405.—Studies at the Italian research station are described for recovering a valuable cellulosic material from bagasse, somewhat similar in type to straw cellulose. The sodium monosulphite and the chlorine gas methods were both found suitable for this extraction. The yield of unbleached pulp amounted to 40-45 per cent. The fibers are longer than those from straw; the raw material contains, however, a large percentage of non-fibrous, hence useless, pitch. The most suitable pulp, from the papermaking view point, was obtained when beaten to about 50° S.R.; it can be mixed with a furnish of longer fibers with less rattle. Studies are in progress for testing the suitability of the material for the manufacture of rayon and esters.—C.J.W.

Straw Paper and Straw Board. W. W. Galloway, Paper Industry 19: 415-421 (July, 1937).—A description of present-day practice in the central United States.—A.P.-C.

Steamed Straw for Paper, Board and Building Board. Abele. Papier-Ztg. 62, no. 34:589-590 (April 28, 1937).—Reference is made to a steaming process of the moistened straw without the addition of chemicals, which gives a yield of about 60 per cent in the case of rye, and 57 per cent in the case of wheat straw. The isolation of the fiber is not as far reaching as with chemical and for paper and board manufacture it is best to mix it with waste paper, waste wood pulp, or steamed wool pulp. Building board can be prepared from 100 per cent steamed straw, depending upon the degree of disintegration, and the removal of the organic substances which have been dissolved during the process.—C.J.W.

New Raw Material for Cellulose Manufacture. Ludwig Szabó. Zentr. Papierind. 55, no. 9:101-102 (May 1, 1937).—Reference is made to the use of *Melilotus alba,* a fodder plant, as raw material for cellulose manufacture in Hungary. The stalks of the two-year-old plant yielded 40 per cent cellulose with long fibers. Paper made from it is of better quality, with a whiter color than that from cornstalks. The plant can be grown for fodder purposes in the first year, and for seeds and cellulose in the second year. Belonging to the family of *Leguminosae,* it has also soil-improving qualities.—C.J.W.

De-Inking of Paper Printed with Oxidizable Inks. P. R. Hines. Brit. pat. 461,219 (March 30, 1936).—Paper printed with, e.g., a linseed oil vehicle is shredded and has its sizing removed by saponification and washing. The paper is then oxidized (by contact with air) in presence of dilute aqueous sodium hydroxide until brown stains appear, and the reaction is continued out of contact with air but in presence of further caustic soda solution, by completely submerging the pulp until the ink is readily detachable. The paper is then disintegrated and the ink removed.—A.P.C.

Waste Paper Deinking and Defibering Process and Apparatus. Harold D. Wells. U. S. pat. 2,083,884 (June 15, 1937).—Waste papers are continuously fed into and submerged in a cold detergent solution to a consistency of 3 per cent to 5 per cent. The suspension is continuously circulated past a screened outlet of the tank to remove properly pulped fibers, further detergent solution being added as required to maintain the consistency of the material remaining in the tank. The pulp is continuously defibered and the dirt and ink reduced to fine particles by rolling the pulp with pressure, and the ink and dirt are removed continuously by screening and washing. (Cl. 92-20.)—A.P.-C.

Silvicultural Methods for Reforestation with Hybrid Poplars. Ernst J. Schreiner. Paper Industry 19: 156-163 (May, 1937).—A description of the methods used in the investigation carried out by Oxford Paper Co. since 1924.—A.P.-C.

Scaling and Measuring Pulpwood. R. F. Rogers. Paper Trade J. 104, No. 20:43-44 (May 20, 1937).—A brief discussion of the 3 principal methods of wood measurement: cords and board feet, cunit measurement, and "wood-ton".—A.P.-C.

Paper Making and Its Problems. VII. The Rag Mill. James Stevens. World's Paper Trade Rev. 107:1632-1636 (May 28, 1937).—A description of the treatment of rags for the manufacture of paper, with practical operating hints on how to obtain optimum results.—A.P.-C.

Pulp Woods of Manchoukuo. I. Introduction. M. Shikata. Rep. Inst. Sci. Res. Manchoukuo 1: 83-102 (1937).—The economics of the subject and the distribution of the forests and pulp woods are discussed.—A.P.-C.

Pulp Woods of Manchoukuo. II. Chemical Analysis of the Pulp Woods Produced in Manchoukuo. M. Shikata and S. Fukuwatari. Rep. Inst. Sci. Res. Manchoukuo 1: 103-128 (1937).—Full chemical analyses of samples of 8 pulp woods (spruce, fir, pine, larch, birch, aspen, and *Tilia amurensis)* are tabulated.—A.P.-C.

Pulp Woods of Manchoukuo. III. Fiber Length of the Pulp Wood Produced in Manchoukuo. M. Shikata, S. Fukutawari and T. Shikata. Rep. Inst. Sci. Res. Manchoukuo 1: 129-138 (1937).—Measurements of the distribution of fiber lengths in pulps prepared from the annual rings of previously analyzed woods by the caustic soda process enable the woods to be classified as follows: (a) fiber lengths range 1.5 to 5.0 mm. *(Picea jezoensis, Abies nephrolepsis,* and *Larix dahurica)*; (b) 0.75 to 4.0 mm. *(A. holophylla* and *Pinus karoiensis)*; (c) 0.3 to 2.0 mm. *(Betula mandschurica, Quercus mongolica,* and *Populus simoni)*. The distribution curves of mixtures of these pulps are the resultants of those of the constituents. Values as in (a) are considered desirable. —A.P.-C.

Chemical Investigations of Wood Substances. VII. Fundamental Investigations of Wood Thinnings and Their Application for Cellulose Manufacture. Wood Constituents of Wood Thinnings. K. Nishida, R. Miyama and H. Hashima. J. Cellulose Inst. Tokyo 13; 186-191 (1937).—Full analyses are given of 36 samples of wood belonging to 5 different species. These indicate that *Cryptomeria japonica Don (Kuroshonsugi), Chamaecyparis obtusa* Z. & Z. (Hinoki) and *Pinus densiflora* S. & Z. (Akamatsu), are suitable for cellulose manufacture, *Pinus thunbergii* Parl. (Kuromatsu), for paper, and *Cryptomeria japonica* Don (Masugi) for paper or rayon.—A.P.-C.

Pulping of Pines. I. H. Boas. New Zealand J. Sci. Tech. 18: 756-761 (1937).—Resinous pines give a satisfactory alkaline cook for kraft pulp. Acid cooking is less satisfactory owing to formation of pitch and low penetration into heartwood, whilst fungoid blueing of timbers is a drawback. The fine pulp particles, containing most of the resin may be separated either by flotation or by partial screening. —A.P.-C.

Wood Substances. IV. Constituents of Deciduous Woods from the River Region of Jala-Kang, Antung. K. Nishida, R. Miyama and H. Hashima. Cellulose Ind. (Tokyo) 12: 27-29 (1936).—The physical and chemical properties of a number of indigenous woods are listed.—A.P.-C.

Wood Density and Chemical Pulp Yield. Anon. Pulp Paper Mag. Can. 38: 691 (Sept. 1937).—On the whole, at the same degree of delignification, the pulp yield from denser wood is greater than that from lighter wood, but the rule is by no means generally applicable.—A.P.-C.

Preparation of Crude Straw Cellulose. I. General Composition of Rice Straw. S. Nagata. J. Cellulose Inst. Tokyo 13: 192-196 (1937).—Analyses of the stem and sheath are given. The extract with 95 per cent alcohol is very high because the water present causes the dissolution of sugar-like substances. The amount extracted with 72 per cent sulphuric acid (lignin) depends on the temperature and duration of the treatments; previous boiling with idlute sulphuric acid diminishes the amount of the 72 per cent sulphuric acid extract which is precipitated by dilution. Previous boiling also diminishes the yields of furfuraldehyde and of cellulose.—A.P.-C.

Thermal Decomposition of Wood and the Influences of Alkali Metal Salts of Various Organic Acids Upon It. I. Thermal Decomposition of Wood, of Its Constituents and of Some Fibers of Animal and Vegetable Origin. S. Huichiro Ochi, Junzo Yamazaki and Sennosuke Sumiya. J. Soc. Chem. Ind. (Japan) 40: 213B (1937).—Air dried samples, 0.13 mm. thick, containing 10 to 12 per cent moisture, of 34 species of coniferous and deciduous woods rapidly introduced into a furnace all ignite in the temperature range of 410 deg to 500 deg. C. With a temperature rise of 1 deg. C. per minute; cellulose-containing materials all show rapid decomposition at 220 deg. to 240 deg. C.; lignin and animal fibers show slower, linear decomposition.—A.P.-C.

Thermal Decomposition of Wood and the Influences of Alkali Metal Salts of Various Organic Acids Upon It. II. The Influences of Alkali Metal Salts of Various Organic Acids on the Thermal Decomposition of Paper and Wood. Shuichiro Ochi, Junzo Yamazaki and Sennosuke Sumiya. J. Soc. Chem. Ind. (Japan) 40: 213-214B (1937).—Treatment of paper and wood with sodium salts of various organic acids raises the ignition temperature about 100 deg. C., but the temperature of flameless combustion is lowered to 250 deg. to 300 deg. C.—A.P.-C.

Chemical Composition of Chinese Cellulose Materials. Teh-Hsi Wang. J. Chinese Chem. Soc. 5: 140-147 (1937).—Analyses carried out on mulberry branches, reeds, kaoliang and maize stalks include figures for pentosan, lignin and Cross and Bevan cellulose.—A.P.-C.

Concerning Manganese in the Ash of Spruce Wood. Viktor Adamek. Papier-Fabr. 35, no. 26: 20-31 (June 25, 1937).—The method for determining the manganese content in the ash is briefly described. From numerous tests it is seen that the manganese content varies greatly in the log itself, but it seems that it is independent of the position or location of the tree.—J.F.O.

Contribution to the Problem of Beech Wood Cellulose. H. Pfretzschner, M. Gotz, and E. Waidt. Papier-Fabr. 35, no. 27: 271-80 (July 2, 1937).—The article starts out to describe the wood situation and the distribution of kinds of trees of Germany. The cellulose content of beech wood and other chemical properties were compared with spruce. The cooking conditions were characterized by a longer period of penetration and an acid rich in SO_2. The yield of pulp was even at higher cellulose contents about 15 per cent lower than spruce wood. Attempts to produce pulp for viscose were successful since the material had a low lignin content and high alpha with low resin and ash contents. In mechanical properties the pulp from beech wood was much inferior to spruce. Beech wood pulp should be ideal for papers requiring high absorbency.—J.F.O.

Stuff from Wood Refuse. H. Postl. Wochbl Papier-Fabr. 68, no. 34: 639 (Aug. 21, 1937).—The author first briefly mentions a few of the earlier methods for using wood refuse, as well as some latter methods; once using the roots and tops of trees. —J.F.O.

Thread Algea in the Paper Industry. Alois Herzog. Wochbl. Papier-Fabr. 68, Special Number: 32-33 (July 2, 1937).—Early in the eighteenth cen-

tury, the formation and possible use of thread algea was thought of. While this thread algea is unusable for textiles, it has been successfully mixed with flax and cotton and made into paper. The composition of this paper is 50 per cent thread algea of the genus Tribonema Conferva, 45 per cent flax and 5 per cent cotton.—J.F.O.

Changes in the Manufacture of Pulp. Roland Runkel. Wochbl. Papier-Fabr. 68, Special Number: 4 (July 2, 1937).—The shortage of spruce sulphite in Germany is resulting in the experimenting and use of beech wood, pines, straw and flax.—J.F.O.

Cellulose from Hardwood Suitable for Rayon. George A. Richter. Rayon Textile Monthly 18, no. 10:679-680 (Oct., 1937); B.I.P.C. 8: 114.—Reference is made to a special process (not disclosed) developed by the Brown Company for utilizing hardwoods as raw material for pulp and rayon manufacture. The pulping process applies equally well to various types of hardwood, such as maple, birch, and beech; the utilization of the waste from small wood-working plants involves certain handling and transportation problems, which will probably sooner or later be solved.—C.J.W.

Further Study of the Pretreatment of Wood in Aqueous Solutions. A. J. Corey, J. M. Calhoun and O. Maass. Can. J. Research 15B: 168-185 (1937).—Wood meal was heated in buffer solutions at constant temperature for periods up to 96 hrs. This extreme pretreatment was found to cause the formation of a substance which is determined as lignin by the ordinary methods of analysis. It was found that wood, heated in a buffer solution at pH 3 for 36 hrs. at 140 deg. C., could be completely delignified, though at a reduced rate of pulping. Jack pine is shown to give results similar to those obtained with spruce. A physical agglomeration of the lignin particles is proposed as an explanation of the results.—A.P.-C.

Spent Tanbark for Board Manufacture. Wochbl. Papier-Fabr. 68, no. 15:286; no. 20:376 (April 10, May 15, 1937); B.I.P.C. 8:78.—The inquirer asks if spent spruce and oak tanbark can be manufactured into binder's or box board. Since bark has very short fibers its sole value is as filler in board manufacture. Its application is possible, provided that the material can be secured at a very cheap price.—C.J.W.

A Rapid Forest Turnover Through Rational Cultivation of Poplars. Svensk Pappers-Tidn. 40, no. 16:391-395 (Aug. 31, 1937); B.I.P.C. 8:78.—Reference is made to the hybridization experiments with poplars by McKee in the United States for producing quick growing species with more rapid cutting cycles. Similar experiments with successful American poplar hybrids are recommended for Sweden to supplement the yield from the slow growing coniferous trees.—C.J.W.

Important Problems in the Utilization of Forests of Norway. Ove Haslund. Papir-J. 25, no. 16:235-238; no. 17:247-251; no. 18:259-262 (Aug. 31, Sept. 15, 30, 1937); B.I.P.C. 8:101.—The author discusses certain important features confronting the Norwegian forest management. Due to the fact that Norway is an exporting country, the chief aim of its forest policy should be the improvement of the quality of wood; since it takes decades before results can be realized in forest operations, a far-seeing policy should be adopted immediately. Frequent reference is made to suggestions in other Scandinavian publications on this subject.—C.J.W.

Present Problems in the Management of Forest Raw Materials. H. Hering. Forstarchiv 13:241-250 (1937); C. A. 31:7643.—A discussion of the political and economic aspects of the chemical and mechanical utilization of wood products in Germany.—C.J.W.

Acetyl Groups in Wood. F. W. Klingstedt. Finnish Paper and Timber J. 19, no. 14:613-618; no. 15:648, 650, 652-654 (July 31, Aug. 15, 1937); B.I.P.C. 8:87.—The author discusses the present knowledge of the acetyl groups in wood and the methods for their determination. Schorger's method was found to be unsatisfactory. Klason's lime method was investigated at different temperatures and for various periods; reproducible results were obtained at 100 deg. C. A correction factor for the volatile phosphoric acid was developed by the author for cases where extreme accuracy is required. Freudenberg's method yields results identical with Klason's lime method at 80-100 deg. C. This confirms Ritter's theory that the readily hydrolyzable acetyl and formyl groups are bound to the polysaccharides of the wood. Hence, it is concluded that the formic acid can only be formed from the formyl groups in the holocellulose. The latter can be readily prepared from chlorinated wood by boiling in alcoholic ammonia. By this method the acetyl groups are readily split off, while the greater part of the formyl groups remains with the carbohydrates. Holmberg's method also gives reproducible results in agreement with Klason's lime method at 100 deg. C.; it is, however, very time consuming. Dense spruce wood does not hydrolyze at a much slower rate than wood of a lighter texture. The process of acetic acid formation during the sulphite cook and dry distillation of wood is not yet sufficiently clarified.—C.J.W.

X-ray Investigation of the Structure of Wood. W. L. Caldwell and K. Lark-Horovitz. Phys. Rev. 51, no. 11:998-999 (June 1, 1937); B.I.P.C. 8:87.—"Wood, regardless of its appearance, exhibits diffraction patterns ranging from perfect fiber structure to almost completely homogeneous rings. Systematic investigations have been made of wood samples graded according to origin, conditions of growth, mechanical properties, and of known fibril angle. Only cellulose patterns have been obtained. Lignin, examined separately, gives a 'liquid' pattern but no indication of it was found in any of the wood samples. The results show that the presence of fiber structure depends on the fibril angle, a small angle being associated with the fiber pattern, and a large angle with a more homogeneous pattern. These results were confirmed by heat conductivity measurements normal and parallel to the grain. Compression and spring wood have a less pronounced fiber structure than summer wood.—C.J.W.

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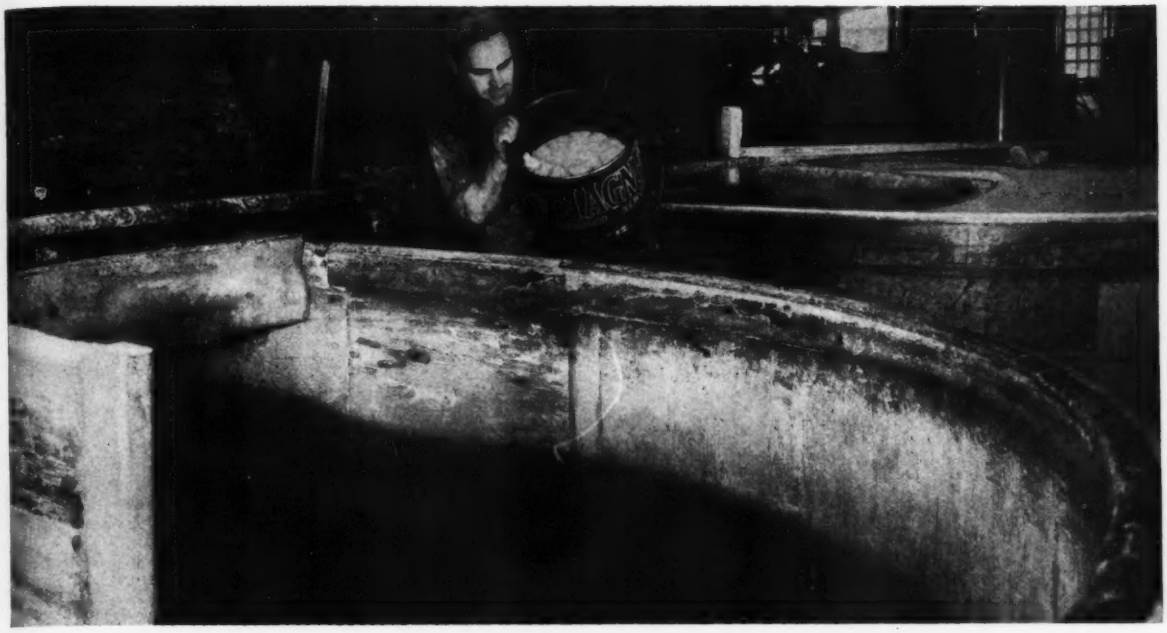

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Present Status of Air Conditioning Practice*

By V. P. Victor[1]

Abstract

The purpose of this paper is first, to outline the fundamental principles underlying the design of various types of air treating systems; second, to present basic methods and equipment items with their respective cycles, and third, to describe representative installations and their performances.

It is not within the scope of this article to discuss the merits and demerits of air conditioning for human comfort.

Many definite advantages can be derived in a great number of industrial plants, from the use of some sort of an air conditioning system.

Wherever the characteristics and quality of raw or manufactured goods are subject to wide fluctuations or spoilage due to the prevailing atmospheric conditions and in order to establish an uninterrupted and scheduled production, the installation of a proper air conditioning system is imperative.

Functions and Methods

Recent numerous attempts to control different properties of air, such as electric charge, odors, etc., by utilization of different electrical and chemical means, have met with variable degree of success.

Inasmuch as up to date no definitely proven benefits or results have been established along these lines, our discussion will be restricted to physical changes in air-water vapor mixtures accompanied by air movement, mechanical purification, and under atmospheric pressures, only.

In general, in spite of the fact that the market is flooded with all sorts of standard so-called "air conditioning" devices, the functions and fundamental types are few.

For simplicity and convenience, the functions are presented in a tabulated form.

I. Control of Temperature (Dry Bulb).

There are only two possibilities present, namely, heating and cooling of the air.

(a) Heating.

Heat can be added to the air by means of radiation, natural or forced convection heaters utilizing different sources of heat such as steam, electric current, gas, oil, etc.

On the other hand, the temperature of air-vapor mixture can be increased adiabatically, or in other words, without any addition of heat from external sources.

This is done by removal of vapor from the air by adsorption or absorption of moisture without cooling. Thus the latent heat of condensation is converted into the sensible heat of air with resulting increase in the temperature. This process of adiabatic dehumidification and heating is still in its infancy, but has great possibilities in spite of very small, if any, fuel economy at the present time.

(b) Cooling.

The cooling of air for various industrial purposes or for cooling of a space or product is performed by circulation of a heat absorbing media through some kind of heat exchange apparatus with natural or forced convection type of air circulation.

The method, regardless of the media used is called refrigeration.

Again, the temperature of an air-vapor mixture can be reduced adiabatically. The moisture content of the mixture is increased, the latent heat of added vapor being obtained from the sensible heat of air. This method, generally called evaporative cooling, has numerous applications, especially where the usually resulting high relative humidity is not objectionable.

II. Control of Humidity.

(a) Humidification.

Moisture can be added to the air in three ways, as follows:

(a) With addition of heat, such as accomplished by passage of air over a surface of heated water, direct introduction of steam, or by spray of heated water.

In the first two instances, the dry bulb temperature of the air is likely to be somewhat increased.

(b) Adiabatically, or as previously described by a process known as evaporative, and

(c) With removal of heat or by utilization of some refrigerating means. This last case of humidification is used relatively seldom, and usually whenever there is a considerable demand for moisture, together with small demand for cooling.

(b) Dehumidification.

The most common method of removing moisture from the air is by cooling the air-vapor mixture below its saturation temperature, thus causing condensation.

This process necessitates artificial cooling or refrigeration.

However, when the saturation (dew point) temperatures are below freezing, complications arise due to the necessity of periodic defrosting of the apparatus, large demand of refrigerating capacity, and high operating cost especially if the dried air is to be reheated.

Adiabatic dehumidification of air by means of adsorption or absorption apparatus makes possible to reduce the moisture content of the air, corresponding to extremely low dew point temperatures without actually encountering them anywhere in the cycle.

Absorption systems utilize various salts or their solutions and the removed moisture from

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Engineer, J. O. Ross Engineering Corp., New York, N. Y.

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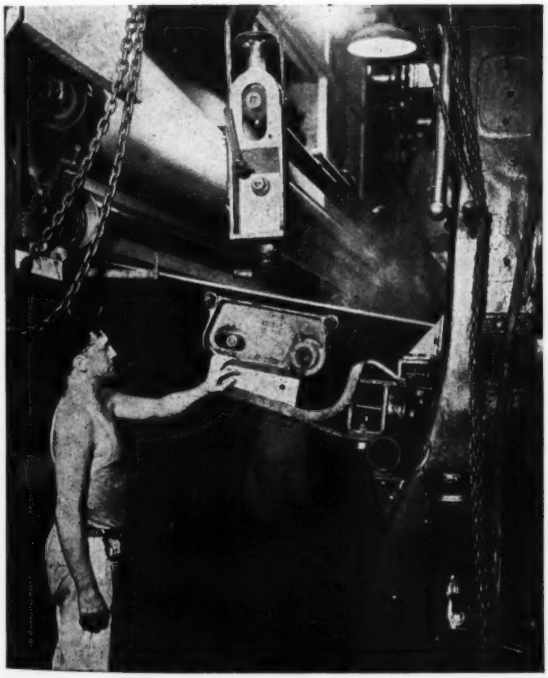

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the air either forms a solution or further dilutes already present solution.

In an adsorption system the water either in a vapor or liquid form always remains in a pure state without undergoing any chemical changes.

Absorption systems are limited to the economic production of humidities corresponding to approximately 20 deg. F. dew point temperature, whereas adsorption systems can dehumidify air to a considerably greater extent, especially when accompanied by cooling.

III. Control of Other Functions.

The other three important requirements of a complete air conditioning system are: Air circulation, constant introduction of fresh air or ventilation, and some means of air purification.

Noise elimination, deodorization, ozonizing, ionization, disinfection, etc., of air may or may not be required, depending upon the duty of an air system.

IV. Graphic Presentation of Cycles.

The psychrometric chart is designed primarily for the purpose of facilitating various rather complicated thermodynamic computations, and to show at a glance the interdependence of temperatures, heat and moisture contents of air-vapor mixtures.

In this paper we will not relate the basis of computations, accuracy, and the method of plotting of these charts, inasmuch as this subject is well dealt with in a number of text books.

Our discussion will be restricted to the significance of the psychrometric chart as far as its application to various cycles is concerned. (Carrier or Bulkeley Charts.)

The values on abscissa represent variations in the dry bulb temperature, whereas the values on the ordinates represent variations in the moisture content of the air-vapor mixture.

Therefore, heating or cooling of the air without affecting its moisture content could be shown by a straight horizontal line AB (Fig. 1). This change is accomplished by increasing or decreasing the sensible heat, such as would take place in an ordinary heating process.

Any changes in the moisture content are represented by inclined or vertical lines. In the latter case, the cycle is isothermal, and as such is seldom encountered in actual practice.

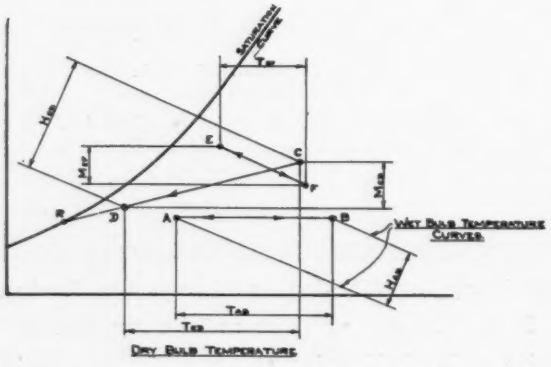

FIG. 1.
Graphical Representation of Elementary Cycles

Lines (CD or EF) sloping upwards or downward indicate moisture gain or loss, respectively.

The process at the same time is accompanied by the changes in the dry bulb temperature of the air. Straight horizontal lines mean constant moisture content, thus maintaining constant saturation or dew point temperaure of the air.

The wet bulb temperature represents the constant heat content of the air-vapor mixture, and, hence, the wet bulb lines show adiabatic changes.

Any increase or decrease in the wet bulb temperature means addition or removal of heat, respectively.

Moving along a horizontal line from A to B involves increase in the wet bulb temperature without changing the dew point temperature. The practical meaning of this process is addition in the sensible heat only.

The previously discussed adiabatic dehumidification and heating could be shown by following the wet bulb line downward, from E to F.

The evaporative cooling or adiabatic humidification is shown by the wet bulb line from F to E.

In actual practice, due to heat of reaction and other causes, the absorption and the adsorption cycles are not truly adiabatic and are seldom used as such.

Usually these cycles are used in conjunction with refrigeration because the common property of absorption salts and their solution, as well as of adsorption materials is the increase in the moisture removing capacity with reduced operating temperatures.

From the above general data one could readily combine several cycles and thus represent performance of a given installation under given conditions.

At this point, one should peruse probably one of the most important from practical point of view, cycles, namely—drying or dehydration.

In any dehydration process where the sole source of heat for evaporation of water is air, one could usually assume that the total heat in the circulated air remains constant. The original sensible heat of air is converted into the latent heat of absorbed moisture. Thus the process is adiabatic, and the maximum obtainable saturation temperature of the leaving air is its original wet bulb temperature. By making proper allowances for efficiency of air distribution, time element, etc., one could fairly accurately predict the extent of the actual moisture removal or pickup by the air.

In case there is an appreciable sensible heat loss in the drier due to conduction through walls, heating up of material or conveyor, etc., one could make proper allowances in the reduction of wet bulb, and, hence, final dew point temperature of exit air.

In any dehydrating problem, the wet bulb temperature of supply air must be taken into consideration, inasmuch as even at 800 deg. F. dry bulb temperature of supply air, the corresponding wet bulb temperature seldom exceeds 150 deg. F.

Where heat for evaporation of water comes from other sources than air, such as steam or high pressure, hot water pipes in the drier proper, the process approximates isothermal cycle and the maximum saturation temperature of exit air may be assumed to be equal to its initial dry bulb temperature.

In the latter instance, smaller volumes of air need to be circulated, but the total heat of exhaust air is considerably higher than in the adiabatic drying cycle.

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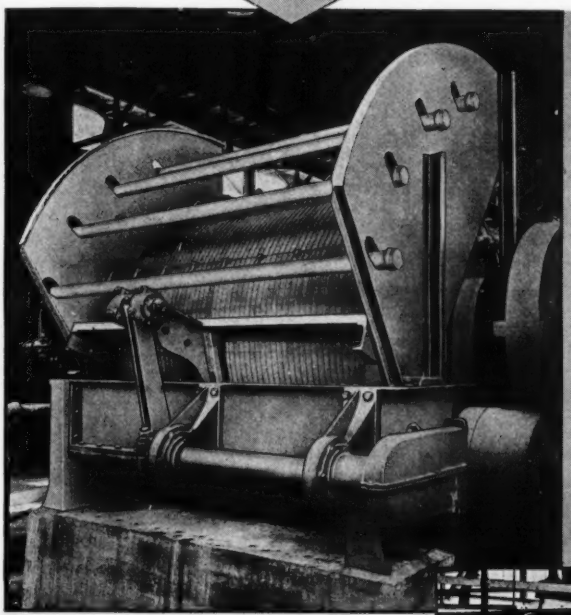

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In this case of all air drying, the reheating of recirculated air or staging will also approximate isothermal process.

As a rule, staging will result in heat economy.

Basic Types of Air Conditioning Equipment

I. Duty and Design Consideration.

Properly designed industrial air systems have to embody means to meet all or some of the following major requirements:

(1) Maintenance of certain temperatures and humidities within given tolerances.

(2) Positive control of air movement and distribution in order to produce necessary effects or changes in the product or the space proper.

(3) Proper ventilation, various degrees of air cleaning and purification.

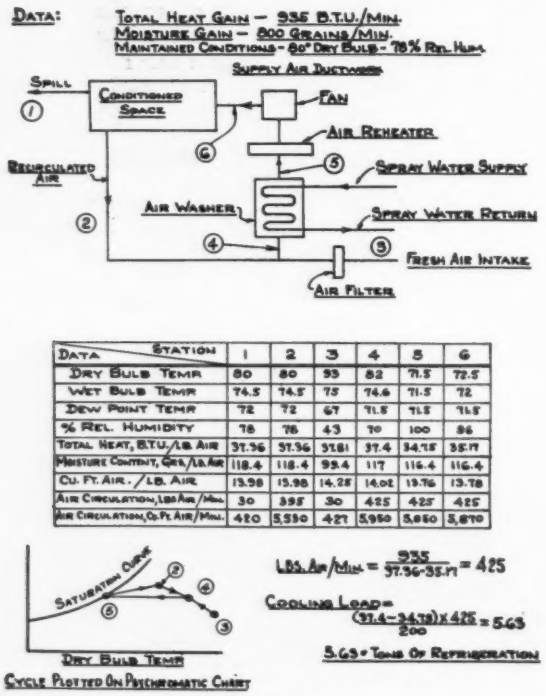
As a rule, only some of these features are of prime importance. Seemingly small changes in the temperature and/or humidity tolerances, compromises in the uniformity or maintained conditions throughout the conditioned space, design conditions and rate of supply of outside air, etc., will drastically affect the design and capacity of the system and its initial cost.

It is also essential to properly establish peak load conditions, various load factors of heat or moisture sources, degree of operating flexibility and reliability, etc.

In addition to the above three major items, the following features may be of significance and have a direct bearing on the design of the system: Degrees of diffusion or the temperature difference between inlet and return air, elimination of noise and vibrations, corrosion resisting materials, location of apparatus and available space, provisions to meet local safety fire and building Codes.

In order to facilitate the establishment of duties of various component equipment items of the system, a diagrammatic presentation of air flow and heat balance has been found to be of definite value.

This type of chart is shown in Fig. 2.



DATA \ STATION	1	2	3	4	5	6
DRY BULB TEMP.	80	80	93	82	71.5	72.5
WET BULB TEMP.	74.5	74.5	75	74.6	71.5	72
DEW POINT TEMP.	72	72	67	71.5	71.5	71.5
% REL. HUMIDITY	78	78	43	70	100	86
TOTAL HEAT, B.T.U./LB. AIR	37.36	37.36	37.81	37.4	34.75	35.17
MOISTURE CONTENT, GRS./LB. AIR	118.4	118.4	99.4	117	116.4	116.4
CU. FT. AIR. / LB. AIR	13.98	13.98	14.28	14.02	13.76	13.78
AIR CIRCULATION, LBS AIR/MIN.	30	395	30	425	425	425
AIR CIRCULATION, CU. FT. AIR/MIN.	420	5,530	421	5,950	5,850	5,870

SATURATION CURVE
DRY BULB TEMP.
LBS. AIR/MIN. = 935 / 37.36-35.11 = 425
COOLING LOAD = (37.4-34.78) x 425 / 200 = 5.65
5.65 = TONS OF REFRIGERATION
CYCLE PLOTTED ON PSYCHROMATIC CHART

FIG. 2.
Typical Air Flow and Heat Balance Diagram

II. Equipment.

The equipment of an air system can be divided into three parts as outlined below. Inasmuch as the provisions for heat removal or refrigerating plant play an important part, a rough outline is given from a point of view of performance characteristics rather than placing an emphasis on theoretical or construction sides. The coordinating equipment or the controls, due to their variety and different combinations, are also placed under a separate heading.

(a) *Air Treating, Conveying and Distributing Apparatus.*

The problems encountered in the design of air conditioning or treating equipment involve mostly heat transmission data and practice.

Essentially, there are two types of heat exchange apparatus, namely—indirect and direct.

The main feature of indirect method, as the name implies, is the absence of direct contact of air with heating or cooling media. Therefore, the final temperatures of air are either higher or lower than those of respective media.

Apparently, under such conditions, as a rule, either the dry or the wet bulb temperatures of the exit air can be controlled. The final air in case of cooling is seldom in a saturated state.

Flat plate, finned or plain pipe type heating or cooling coils used in connection with circulation, condensation and evaporation of cold or hot water gases, hot gases, steam and refrigerants, respectively, are the most used devices for this type of service.

In case of direct heat exchange method, the air to be conditioned is brought in intimate contact with the working media, which usually is water.

There are a great number of devices which fall into this class, the representative types of these being: Spray, drip or wetted surface types of air washers or scrubbers.

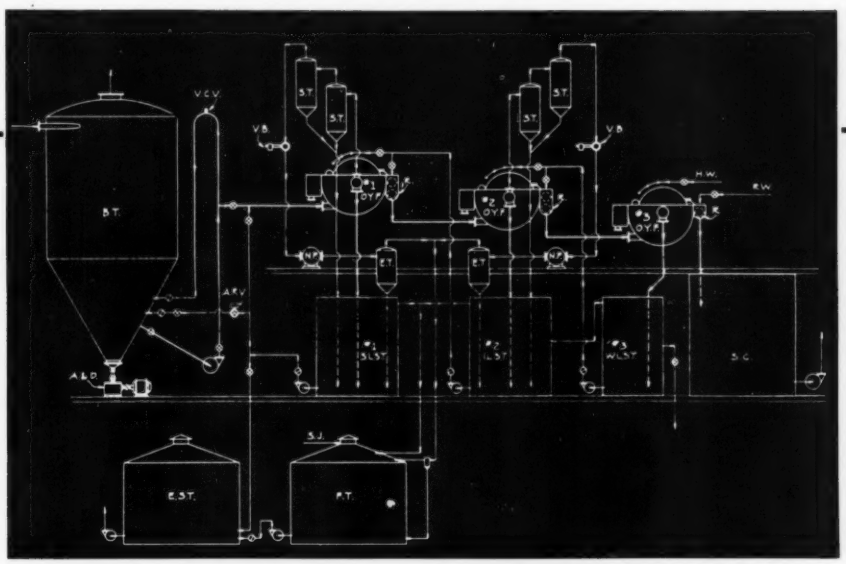
In the spray type due to the very fine division of sprayed water, the heat exchange or contact area is tremendous, thus allowing a small temperature difference between leaving air and water.

The circulated water can in turn pass over or through some heating or cooling device. Sometimes the cooling coils are located in the path of spray or air, thus somewhat approaching indirect method of heat exchange.

The spray type air washer with properly maintained temperatures of circulated water could be used for humidification (Line GH, Fig. 3) and de-humidification (Line GH, Fig. 7) with heating or refrigerating effects, respectively. The exact path of these changes cannot be very well plotted on the chart, but the final result in both cases is saturated air at the temperature K or H.

The path GJ represents evaporative, adiabatic cooling and follows closely the wet bulb line.

The other types such as drip, splash, or



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On three counts, the Oliver System of brownstock washing proves to be superior to washing by diffusion:

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wetted surface type are used usually for humidification, only.

The absorption equipment usually consists of a scrubber (viscous filter) or an air washer with wetted surfaces. This is due to the difficulty of removing entrained solutions of various absorption salts, were such solutions finely divided. The commonly used salts are lithium chloride, calcium chloride, sodium nitrate, etc.

The direct spraying or atomizing of water in the room is satisfactory for increasing the humidity, but great care must be exercised in designing, controlling and maintaining the equipment in proper shape. Wherever the conditioned space requires constant supply of heat and moisture throughout the year and the maintained temperature is rather high, either the direct introduction of steam into the path of circulated air or the use of an evaporative pan humidifier in conjunction with air reheater will prove satisfactory.

In either event the humidification, as a rule, is accompanied by the increase in the temperature. This feature limits the application in a number of cases from the heat demand point of view. The direct introduction of steam has the additional disadvantages of noise and odor.

The last major method of air treatment using direct contact is the adsorption cycle.

Different materials could be used, the most prominent of them being the so-called silica-gel (SiO_2) and activated alumina (Al_2O_3).

Activated carbon also has certain adsorptive properties and is used extensively in solvent recovery and odor removal.

Contrary to absorption cycle using constantly circulated, regenerated and cooled solution, the adsorption method is an intermittent process, utilizing several beds of adsorbent.

These beds are first subjected to the current of air to be dehumidified, then to the current of hot air which drives moisture out of the bed or reactivates the material, and finally to the current of cold air which cools the bed. These steps are properly timed and are controlled by switch over dampers or mechanism similar to Geneva motion.

Air cleaning is performed by means of air filters. There are a great number of filters on the market, varying considerably in the first cost. However, studies have shown that for equal performances the initial and operating costs will balance over a period of years.

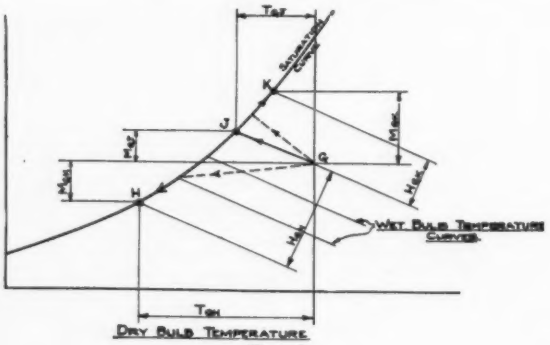

FIG. 3.
Typical Airwasher Cycles

Air conveying equipment consists of fans and ducts.

For proper air distribution and power economy, the design of duct work and the selection of proper type and size fan must be carefully worked out.

The air distributing means consist of all sorts of special nozzles, outlets, deflectors and grilles. Induction of secondary air currents, distance of air travel, degree and rapidity of outlet air expansion, desirability or objection to air currents or drafts—are some of the considerations governing the design and application of these devices.

(*b*) *Refrigerating Equipment and Sources.*

Any attempts to cover this phase of air conditioning would prove to be too voluminous, inasmuch as this is an old and a well developed field.

Therefore, we will outline sources of heat removing medias and equipment making possible their use.

The commonly known and used methods, materials, or cycles are as follows:

1. Compression refrigeration cycle using either reciprocating or centrifugal compressors.

The most used refrigerants are ammonia, fluorine or Freon group, methyl chloride, carbon dioxide and sulphur dioxide.

This type of machinery is usually driven by electric motors, gasolene or diesel engines, steam engine, and sometimes steam turbine.

The common characteristic is the lack of reserve and hold-over capacity but quick response to demand.

Units can be obtained in reciprocating types, practically in any size. For small and average size air cooling system this type of refrigeration is predominant.

Because of lack of satisfactory means to reduce the capacity without affecting the temperature, in medium and large plants it is advisable to subdivide the refrigerating machinery into two or more compressors. This results in greater flexibility, power economy and reliability.

The selection of refrigerant and type of air handling or treating equipment must be made to suit local safety or building codes.

A relatively recent attempt to apply the reciprocating compressor for all year service in comfort air conditioning field is known as a reversed cycle.

In summer the refrigerating plant operates in the usual way, but in the winter the refrigerating plant is removing heat from outside air and the condenser is cooled by the air to be heated and supplied to the house.

Due to low heat content of the winter air this scheme is not very practical from a commercial point of view.

Several systems have been installed but so far few, if any, definite advantages have been established. This cycle with certain alterations may have a promising future.

2. Absorption system, due to the bulk of its

equipment, and, therefore, high initial cost, is not very popular.

The main advantages are large hold-over or cold storage capacity, practically no moving parts, and low operating cost when steam is available.

Wherever there is a constant and large demand for refrigeration and operator generates his own steam, the absorption system is a strong competitor for any other form of artificially produced refrigeration.

3. Water vapor refrigeration where water is cooled under vacuum: The vacuum may be produced by high speed multi-stage centrifugal compressors or by thermal compressors, usually known as steam jets, evactors, boosters and Venturi tubes.

The condensers, following standard power plant practice, may be of barometric or surface type.

The centrifugal machines can be direct connected to steam turbine or through a speed increasing gear box to an electric motor.

The main advantages of this type of refrigeration is the ability to meet overload with small increase in water temperature, safety, and under certain conditions, low operating cost.

Obviously, when water is the cooled media, the limiting temperatures are in the vicinity of 36 deg. F. Other liquids can be cooled with or without exposing them directly to vacuum.

The indirect method has been successfully used in cooling of acids, milk, beer, etc.

The vacuum type of refrigeration covers essentially higher temperature range. Production of lower temperatures is not likely to be an economical process.

4. The utilization of well water either for preliminary or, if temperatures will permit, for final cooling of air is probably the most economical form of refrigeration. In any event, the use of well water for condensers should be always considered.

5. Ice blocks used for cooling of water help to reduce the initial cost of the system, but tend to increase the operating cost. Where moderate cooling is required for only a short duration in a year and the cost of ice is within reason, this type of purchased refrigeration has definite advantages, such as simplicity of operation and maintenance, low initial investment, and safety.

6. The use of outside air, especially in winter time, with or without supplementing cooling, should be considered.

By means of evaporative cooling in summer time the temperature in the conditioned space could be somewhat lowered. There are several promoters of this scheme in the comfort conditioning field, but there is as well a great difference of opinion as to the practicability of such a process.

7. Other methods of refrigeration, such as using the circulated air as cooled media in direct air refrigerating plants, application of liquid air, etc., are still in their infancy.

When judged from the present orthodox point of view, such schemes have no practical value.

In conclusion, when selecting a refrigerating system for an air cooling or conditioning installation, one should always remember that the performance and size of the plant to carry a given cooling load, depend upon the involved temperatures, and, hence, upon the number of stages of heat transfer. The new safety code for the City of New York calls for a certain number of these stages to be used in connection with various refrigerants and for different fields of application.

(*c*) *Controls.*

In order to automatically maintain required conditions, the functions of various component equipment items must be properly coordinated. It is needless to say that no matter how well the system may be designed, its performance will be governed to a great extent by the action of controls.

There is an almost infinite number of controls on the market and most of them are highly satisfactory in their proper place. The misapplication of control equipment often causes unjust condemnation.

Therefore, a very careful selection of not only type but size, as well as of thermostats and valves with due consideration to the nature of service, physical location, etc., is of prime importance.

The location of the element and the type of conditioning apparatus have a great influence on the accuracy of the controls, for example:

From the psychrometric chart, one may easily notice that one degree variation in the dew point temperature will produce roughly one half the variation in the relative humidity that would be caused by one degree variation in the wet bulb temperature. In other words, the dew point control is twice more accurate than the wet bulb. In order to obtain a saturation temperature in the cycle, an air washer must be used.

With a properly designed air washer it is possible to control humidity within a total range or tolerance of 4%; whereas when using cooling coils with expanded refrigerant or other cooling media together with some humidifying device one should expect a total variation in the humidity of approximately 8 per cent. These variations may be of very short durations but could be easily detected by a sling psychrometer.

There are two main classes of controls, as follows:

(1) So-called self-contained thermostats and valves where the power for the operation of the valve is derived from the expansion and contraction of the media in the thermostatic element. Since sufficient pressures have to be generated for valve operation, the action of such an arrangement is sluggish with resulting increase in the tolerance of maintained conditions. Full closing of the valve is also not likely to take place. Possibly, the simplicity is the outstanding advantage.

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(2) Relay type thermostats which derive their action from the expansion and contraction of the media in the element, but the power for the operation of controlled devices comes from an external source, such as compressed air, electric current, hydraulic pressure, etc. The mechanism of the thermostat acts only as a relay.

Great flexibility, sensitivity, and various arrangements of control equipment are thus made possible.

The action of valves may be accelerated and retarded, and a single thermostat may operate a number of controlled devices in a certain predetermined sequence and speed.

The medias used in the elements, relay mechanisms, valves and valve operating motors, as well as other items and their functions are covered by the literature of respective manufacturers and need not be discussed here.

In industrial fields the majority of systems are required to maintain one set of conditions all year throughout. Such practice, however, in the comfort conditioning work, would result in definite discomfort.

In summer time unpleasant sensations and in extreme cases, colds will be experienced when entering or leaving the conditioned space; whereas in winter time, the maintenance of constant humidity may cause excessive sweating and frosting of windows as well as produce colds.

It is a fairly well established fact that in order to give a maximum of comfort for human beings, the charactertistics of air in the conditioned space must be varied to suit the prevailing temperature of outside air.

The relay type controls made possible the development of the so-called compensated effective temperature control system which meets the above mentioned requirements. The principal functions of this system are, first—in summer to decrease and to increase the temperature difference between outside and inside (conditioned) air in a certain predetermined and possibly, adjustable relation with drops and rise in outside air temperature, respectively, and, second—in winter to reduce the humidity in the conditioned space to suit the drop in outside temperature. In either case, regardless of temperature, the humidity is maintained within a comfortable range.

Variable sets of conditions could be controlled with due regard to time element, using master and sub-master or pilot and sub-pilot, or cam actuated combinations of controls.

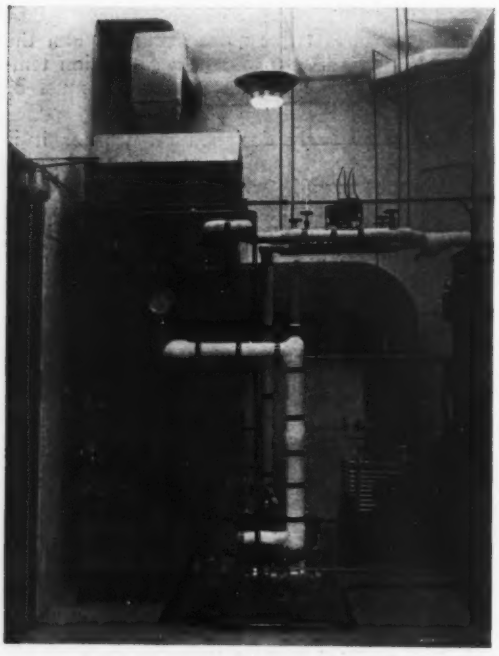

Fig. 4.

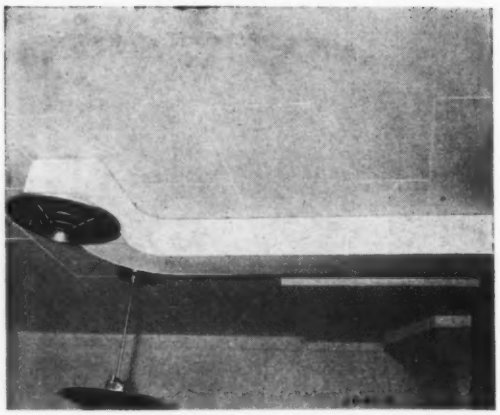

Fig. 5.

Representative Installations

In order to present the practical application of above data, several systems are described below with emphasis being placed on the type of service. These examples cover very well the current practice, and with few alterations or use of some other auxiliary equipment, including refrigeration, could be adapted to meet practically any requirements. They cover rather expensive, but precision type small and large industrial installations, low initial cost systems, and low air temperature process or product cooling jobs.

I. Paper and Textile Testing Laboratories.

Characteristics of paper, textiles, glues, certain chemicals, and especially bacteria, are subjects to wide fluctuations and discrepancies due to the variable atmospheric conditions.

Because of the usual demand for extremely close control of maintained humidity, the conditioning apparatus consists of a spray type air washer with a dew point temperature control. The dry bulb thermostat controls the admission of heat to the air reheater.

Thus, by controlling dry and dew point temperatures, the relative humidity is maintained within close limits. Fig. 4 illustrates the unit proper which incorporates water cooling coils, spray nozzles, air reheater, fan and motor. Fresh air intake, supply and return ducts are also visible. Refrigerating plant consists of a Freon reciprocating compressor mounted on the same base with water cooled condenser, motor, liquid receiver and auxiliaries. The steam control valves for air and water heaters are of an

air operated type. The control panel board with remote bulb type air operated thermostats is on the right. The operation of the entire system all year throughout is controlled from one single push button station without opening or shutting off of any valves, starters, etc. The temperature of 70 deg. F. is maintained with plus and minus 1 deg. F. variation, and the relative humidity within 64 to 66 per cent range.

Due to the usually small size of these laboratories, the air distribution is performed positively without any draft, by means of special outlets, similar to one shown in Fig. 5.

II. Dough Fermentation Room System.

Similar to the testing laboratories, in this tvpe of air conditioning system all functions must be accurately controlled.

The room size is considerably larger, but the humidity, temperature, air distribution and velocities, and sanitary operation are even of greater importance than in the former case.

The apparatus consists again of an air washer with all other equipment being larger, but operating under the same principles. The duct work is bulkier and much more complicated due to exact requirements of air circulation. Fig. 6 illustrates the room, and Fig. 7 shows the close-up view of washer, cooling coils, and control board. Electrically operated thermostats and valves were used.

The cooling coils are located in the path of air. Ammonia is used as a refrigerant. Magnetic valves and thermostatic expansion valve are used for the regulation of refrigerant circulation through the coils. Under proper weather conditions, ammonia is cut out and outside air is used for cooling, if such is required. Air filters are used for cleaning of outside air, prior to its mixing with recirculated air.

This type of a system is ideally suited where the moisture content of a product must be controlled.

In spite of the fact that such systems are rather expensive, the obtained advantages and savings in a number of cases warrant their installation.

III. Gravure Plate Department Installation.

The function of this system is to maintain a constant temperature and humidity all year throughout. In summer air is cooled and dehumidified by cooling coils using expanded Freon as a refrigerant. Air reheater and humidifying means provide the necessary sensible heat and moisture when required. Due to

Fig. 6.

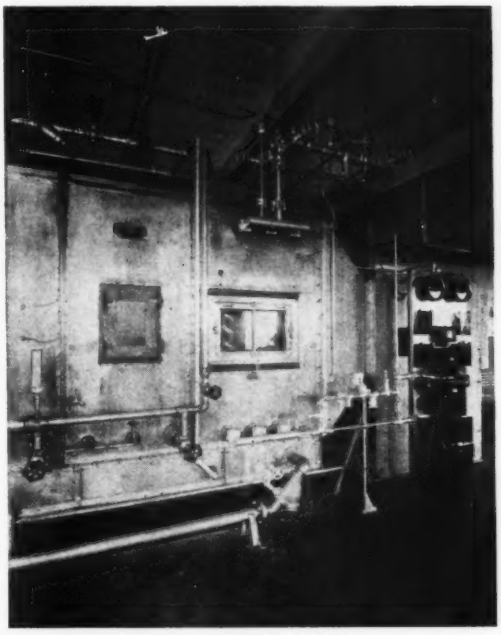

Fig. 7.

the smaller bulk of the system and a reduced number of equipment items, the initial cost of "direct-expansion" installation is usually from 10 to 35 per cent less than that using an air washer. As previously mentioned, the accuracy of control is somewhat sacrificed.

The entire volume of fresh and recirculated air prior to passing through the apparatus is cleaned by a battery of air filters.

This single apparatus with a single set of controls takes care of several separate rooms. The controls

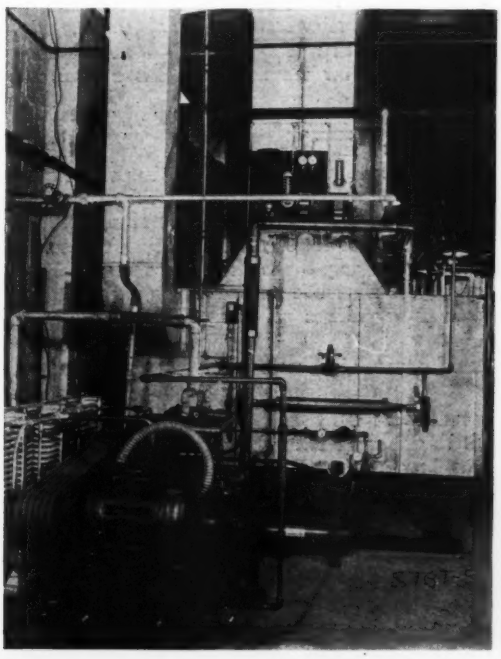

Fig. 8.

are of an air operated type. The flow of refrigerant is controlled by an air operated thermostatic expansion valve. In Fig. 8 one can see various provisions for elimination of vibrations, auxiliary equipment for dehydration and distribution of Freon, control board, some of the ducts, and filter casing.

This type of a system today is the most popular in the comfort conditioning field due to low initial cost and compactness. However, the N.Y.C. safety code prohibits the installation of direct expansion (single heat transfer stage from air to refrigerant) systems under certain conditions.

Most of the average size stores located on the first floor use this type of a system for cooling of the air in summer only. Large cold storage buildings with very few occupants still can use direct expansion with either forced or natural convection type air coolers.

IV. Product Cooling

Production of cold air for product or room cooling or for certain processes could be divided into two classes, namely—first, above freezing, and second, below freezing. The former has a popular name of air conditioning, and the last has been known as an outright refrigeration problem.

Inasmuch as this almost entire paper has been devoted to the discussion of the first class, under this heading we will touch upon the air cooling phase near or below freezing temperatures.

The freezing of moisture out of the air consists of depositing this moisture in the form of ice or snow on cold surfaces. Because of this fact this method is of an intermittent nature. Attempts to prolong the operating period by scraping off the ice, or circulating brine over the evaporator still will not make the cycle continuous.

For a truly continuous cycle, the use of adsorption system followed by cooling coils removing only the sensible heat, is imperative.

Such systems are expensive, and therefore, due consideration must be given as to the maximum desirable continuous operating period of equipment.

One of the hardest problems known in air conditioning work is the maintenance of sub-freezing temperature accompanied by high relative humidity, for example, egg storage rooms.

Fig. 9.

Fig. 10.

Due to the absorbing properties of sodium or calcium brine, air washers using these media for air cooling cannot produce saturated air.

Direct spray of water into the air stream or the space proper has several disadvantages.

As a rule, problems of such nature must be carefully analyzed and the duty of the system clearly outlined.

The coils used for air cooling are made of either plain pipe or of pipe equipped with heavy fins spaced widely apart, as shown in Fig. 9. A complete installation is shown in Fig. 10.

The air temperatures are above freezing on this particular job, but the system is capable of producing sub-freezing temperature and operate for approximately six hours before defrosting.

Summary

I. Initial and Operating Costs.

It is not unusual nowadays to receive bids submitted by reputable firms for an air conditioning system that will vary considerably in price. Doing business at a loss or excessive profits could hardly be the explanation of the above fact.

These discrepancies are due to the misunderstanding of the duty of the equipment and to the absence of important devices which reduce the operating and maintenance costs.

Furthermore, in industrial fields the standard equipment seldom can exactly fill the requirements, but can at best only be adapted to them.

The industrial systems have to be individually designed and built in order to derive the maximum benefits. In certain cities attempts have already been made to standardize the duties, specifications, etc. of air conditioning systems in comfort fields. Due to an almost infinite number of variables this would be hardly possible in industrial work.

Additional investment is very often warranted by the savings in operating cost. Both power and water costs can be substantially reduced through the use of cooling towers, evaporative condensers, off-peak cold storage systems, diesel and gasolene engine drive, exhaust steam turbine drive, etc.

In short, throughout the history of technical prog-

ress the efficiency was always obtained with sacrifice in simplicity and initial cost.

II. Future Trend.

In conclusion, one may safely state that in spite of a great progress made during the past few years, the air conditioning as a whole, and especially the comfort phase, is still in its infancy.

But, by no means should one consider this work as a recent development. This brings up the question of just exactly what may be included in the scope of industrial air conditioning. Drying of water at elevated temperatures and maintenance of low temperatures with some consideration of humidity, have been and still are recognized as strictly drying and refrigerating problems. However, in the writer's opinion, any process involving computations of air-water vapor mixtures and, therefore, references to psychrometric chart, regardless of temperatures, is definitely an air conditioning job. Popular conception of air conditioning is still erroneously restricted to cooling of restaurants, beauty parlors, etc.

As far as the future trends are concerned, these could be divided into two classes—comfort and industrial.

In the comfort field efforts are being made to put the equipment to work for a greater number of hours during the year, or to increase the load factor. Such efforts are illustrated by reversed refrigeration cycle, cooling systems using ice, etc.

However, in order to further reduce the costs, the development of central refrigerating plants selling the cold water or brine to tenants seems to be a step in a logical direction. The principal advantages are: The reduced initial and operating costs; saving in space; increased safety, and greater reliability. The problem of conservation of cooling water for condensers also lends itself to an easy solution.

The air washer type of apparatus is and most likely will be for years, the most popular equipment for large comfort or industrial jobs.

Industrial developments will consist in the greater use of adsorption process, improved means of air purification, and, in general, many a problem heretofore considered and solved by a rule of thumb will be approached from the so-called air conditioning point of view. The resultant understanding and solution may lead to greater economy and improvement of the product or service.

Economic Factors of Refining*

By the TAPPI Stuff Preparation Committee, G. Lamont Bidwell, Jr., Chairman [1]

Examination of the literature on papermaking, as far as we know, does not disclose any information on the magnitude or scope of refining equipment, or the cost of operation and maintenance.

The Stuff Preparation Committee of the Technical Association of the Pulp and Paper Industry has been endeavoring to obtain data on the design of beating and refining equipment, the capacity per unit and power consumption of each type and model, but the data available are not yet comprehensive enough to be of much use to students or papermakers. The recovery in the papermaking industry has delayed progress in this direction as those capable of giving, collecting and interpreting this data have been fully occupied in daily routine work.

In this paper, efforts are made to discuss refining problems from a broad angle designed to emphasize their importance to the industry as a whole and with the hope that the individual interested in this subject will be stimulated in his efforts to provide solutions for these problems.

Production in the United States

The Department of Commerce figures for 1936 give a total production of all grades of paper and paper board of 11,985,552 short tons. Since newsprint does not require the use of beaters and jordans in its manufacture this tonnage, amounting to 938,287 tons is deducted leaving a total of 11,037,265 tons. For the purposes of this article the total of 11,000,000 is used. The Department of Commerce report divides this total into approximately 5,500,000 for each class, i.e., paper and paper boards of all kinds.

Refining Equipment in the United States

In order to obtain an approximate number of beaters and jordans in use the list of mills published by Lockwood's Trade Directory has been reviewed and wherever specified the number of beaters and refiners in use has been obtained. Some mills have not reported their refining equipment, consequently the following figures can only be approximate. Furthermore it does not follow that all of the beaters and refiners reported are in commercial use. As far as possible all broke beaters have been eliminated. The total figures of all types and sizes are as follows:

Beaters	4972
Refiners	2567

Capacity of Refiners

For the purposes of this article the total of beaters and jordans are considered together since in some mills beaters are relied upon to give most of the refining action required whereas in others jordans or refiners are perferred. The average capacity of all refining units is obtained by dividing the total tonnage produced by the number of units and when this is done we find that the average capacity is only five tons per day.

It is well known that some grades of paper require more refining action than others and a subdivision of each group gives the following capacity per unit:

Glassine 2 to 3 tons per refiner per day.
Book papers 6 tons per refiner per day.
Paper boards 10 tons per refiner per day.
Kraft liner 25 tons per refiner per day.

Owing to the low capacity of beaters and refiners it is now necessary to have a large number of units behind each paper machine. In some mills ten units

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Reigel Paper Corporation, Riegelsville, N. J.

are required for one paper machine. The capacity of paper machines has increased in recent years but it does not appear that the capacity of refiners has increased to any extent. Paper machines are being made wider and operate at higher speeds in order to reduce cost of operation but the development of large capacity refiners is still lagging. The thought has been expressed by some students of refining that there need be only one refiner to a paper machine because the weakest links in the chain are the paper machine wires and felts. It is believed that a large refiner could be designed which will be free from mechanical defects and breakdowns to at least the same degree as a paper machine.

The advantages of large capacity refiners must be obvious but are mentioned in order to emphasize the necessity of improvement in capacity.

(1) Less floor space, pipes and valves required.
(2) Less labor needed.
(3) Lower maintenance necessary.
(4) Greater uniformity in stuff properties possible.

Power Consumption

Mill operators pay a great deal of attention to the efficiency of their power plants and have improved the efficiency of their production equipment but the remark is often made by paper makers that there is not much to be saved in power in their mill. Perhaps this may be true in some cases but when we examine the estimated power figures for the industry as a whole the savings that can be made are not small.

The cost of power for refining varies according to the degree of refining action required for a given grade of paper and power costs vary in each mill but the average cost is estimated to be $1.50 per ton of paper.

Taking the total production of 11,000,000 tons we have a power bill of $16,500,000 per annum. The power required and cost for the following grades is approximately as follows:

Glassine	27/h.p./day/ton	$1.62 per ton
Book papers	16/h.p./day/ton	0.96 per ton
Paper boards	10/h.p./day/ton	0.60 per ton
Kraft liner	16/h.p./day/ton	.96 per ton

Refiners having a capacity of 100 tons per day could reduce the power at least 50 per cent or $8,250,000 per annum.

Steam Turbines versus Reciprocating Engines

Perhaps the best illustration of modern development of capacity is found in the present day use of turbines in place of reciprocating engines. Steam turbines are now used exclusively for large capacity although thirty years ago their development was opposed on many grounds but principally, high speed and doubts as to reliability, under steady operation over long periods. History shows that many efforts to develop a satisfactory turbine ended in failure, but perseverance completely eliminated the reciprocating engine. It would take too long to go into every reason for this change and it is not necessary to do so in this paper but the main reason was the low capacity of the reciprocating engine. The largest reciprocating engine developed about 12500 h.p. and required large floor space. Some turbines developed 200,000 h.p. in central stations in a comparatively small space whereas, sixteen of the largest known reciprocating engines would be required to produce the same power in a space fifty times larger than would be required by the turbine. In addition to cost of buildings the savings in labor and maintenance were also in favor of the turbine.

Operating Efficiency

Under ordinary commercial operations it is found that variations in stuff properties occur when only one refiner is used. This may be due to variations in the incoming pulp or to differences in setting by the operator. For instance, in some mills the jordan plug is moved in or out at frequent intervals. When using a large battery of refiners behind a paper machine it is impossible to set each one so as to produce the same stuff properties from each. Even when power input is used as a guide by the operator variations in stuff properties are possible, due to uneven wear of tackle. In cases where ten or more refiners are used for one paper machine it is impossible to adjust each one uniformly but dependence is made on the composite stuff properties to meet the sheet requirements.

Obviously it would be advantageous to have only one or two refiners instead of ten or more but there now seems to be a tendency to boast about large numbers of refiners per paper machine instead of less.

Uniformity of Stuff and Sheet Properties

One of the largest items of cost in paper and, to a less extent, in board manufacture is off grade paper and board which must be sold as second or re-used as broke. When returned to the systems as broke the net salable tonnage of the mill is reduced, operating problems are increased and the cost of production is increased. The percentage of broke returned varies in each mill and there is a large difference between mills making fine grades of paper in comparison with mills making coarse grades.

Even when taking a low figure of 10 per cent broke we have decreased the total tonnage throughout the industry of over 1,000,000 tons per annum based on 1936 production figures. The loss incurred again varies in each mill but assuming a loss of $10.00 per ton we have a staggering loss of $10,000,000.00 per annum. All broke cannot be attributed to refining equipment but if the stuff properties delivered to the head box of a paper machine are uniform day in and day out the machine tender will obtain a higher average tonnage of salable paper or board.

It has been demonstrated that wide and fast running paper machines can produce quality equal to slow running machines in most grades of paper and board and since this is possible it should also be practical to produce large quantities of suitable stuff with large capacity refiners.

Development of Beating and Refining Equipment

It would seem that the art of making paper is far in advance of the art of designing paper making equipment which explains why the paper maker is producing paper to specifications with deficient equipment. Comparing the many advances in paper machine construction and control of operation with the present condition of stuff preparation equipment, the lag in the development of the latter is quite evident. This lag may be explained somewhat by looking back to the days when the art of making paper was not understood as well as it is today. The paper maker depended largely on local foundries for many of his needs. The equipment was built to meet the fancy of the individual operator and specifications were lack-

ing. The relation between the operator and builder was essentially that of leader to follower. Apparently that same relationship, to some extent, still exists; the builder, in many cases, awaits the lead of the operator. However, with the development of standard specifications for many grades of paper and the more exacting demands of the consumer, the manufacturer is looking for new equipment to aid in maintaining a consistently standard quality product. In building a new mill or in modernizing present equipment he finds he must choose his beating and refining equipment without knowing exactly what may be expected.

It would seem that the designer must take the lead in developing new machines, for eventually the designer will quite properly become the leader and this change in relationship between designer and user is now in a state of flux. The designer's great difficulty, however, is the absence of the important data necessary in properly designing such equipment. This is due in part to poor cooperation between the designer and user, the latter often not wishing to divulge the results he is obtaining. The chief reason, however, is due to the fact that the user himself does not know precisely what his equipment is doing. While many mills are trying to find out and are making considerable progress, as are many designers, a great deal is still to be known.

Fundamental Research

Here, in our opinion, is one of the most important factors confronting the industry today. A fundamental study must be made on the problems of beating and refining; the effects of the many variables must be definitely determined, and a common denominator must be developed for evaluating such equipment in order that the designer may intelligently do his part in the much needed development of modern stuff preparation equipment.

If we base our studies on equipment now available we would expect to determine what effect the following variables have on stuff properties.

1. Impact and contact inches.
2. Gap or clearance between revolving and stationary elements.
3. Capacity of refining elements (width and depth of spaces or cells)
4. Pressure.
5. Consistency.
6. Speed of rotation.
7. Arrangement of bars.
8. Angle of shear.
9. Turbulence.
10. Materials of construction (effect of hardness)
11. Temperatures and pH.
12. Dwell period.

Also an acceptable common denominator for evaluating such equipment must be developed together with any other information which is necessary in order to determine the true comparative efficiency of a beater or refiner.

While this Committee has made some progress in suggesting formulae for use in determining impact and contact inches in beaters and refiners, it is quite obvious that this work must be carried out in a laboratory capable of producing the desired results. Such work of course, will necessitate the expenditure of a considerable amount of money and will take a number of years to complete.

One of the most modern laboratories in this connection is to be found at the New York State College of Forestry, Syracuse, N. Y., where a new beater of 600-lbs. capacity is being installed. This beater represents the most modern developments in beater design and control and when completed should present an excellent source of information on some of the variables mentioned above.

Your Committee has been working with Professor Libby in an effort to formulate a definite working program as a full time research project under his supervision. The work would be done by a qualified research worker with a background of several years of actual experience in a paper mill or research laboratory. Such an undertaking would cost about $5,000.00 a year and would take at least five years to complete.

Another method of attacking the problem of fundamental research in beating and refining has been described by Arthur B. Green in the November 13th, 1937 issue of the *Paper Mill.* Here Mr. Green suggests starting without a mental preconception of what a beater or refiner will be like. Mr. Green lists eleven distinct actions that occur during the beating and refining process namely:

1. Cutting of fibers by knife edges.
2. Cutting of fibers by fibers.
3. Crushing of fibers between surfaces.
4. Crushing of fibers between fibers.
5. Rubbing of fibers between surfaces.
6. Rubbing of fibers on fibers.
7. Impact of fibers on surfaces.
8. Impact of fibers against fibers.
9. Impact of surface on surface with fibers between.
10. Hydrostatic pressure, sustained and intermittent.
11. Vacuum, sustained and intermittent.

With these in mind a separate laboratory machine would be built to produce each one of these mechanical actions separately. Their effect on the stuff properties would be determined by all the usual tests including burst, tear, fold, tensile, stretch, shrinkage on drying, formation, resistance to moisture, water and oil, pliability, thickness, porosity and opacity. From these tests, Mr. Green states, the manufacturer can choose those mechanical actions which he desires for his particular grades of paper, and have commercial machines built which in series will reproduce these actions. It is recognized, of course, that the difficult step lies in building up to mill scale from the laboratory equipment. Such a program it is estimated will cost approximately $10,000.00 a year and may take from two to ten years to complete.

Whether the fundamental studies are made as recommended by Mr. Green or are conducted on present available equipment, the total amount of money expended will be a very small fraction of the total amount spent each year by paper mills throughout the industry on commercial experimental installations.

Summary

The development of stuff preparation equipment has not kept pace with modern paper machine developments. The use of small capacity refiners for large paper machines is not efficient and eventually large capacity units will be properly designed and installed in their place.

A carefully formulated plan of fundamental research on the problems of beating and refining conducted under competent supervision will reveal the important information which is sorely needed for the more intelligent and proper designing of stuff preparation equipment.

A tremendous saving can be realized in the preparation of stuff, if the proper equipment is developed, by reduced power, labor, maintenance, floor space and more uniform stuff properties.

Cowles Classifiners and Waste Paper Systems*

By Edwin C. Cowles[1]

Abstract

Cowles Classifiner waste paper installations now operate much more efficiently, due to improved methods of controlling flow of rejected stock and handling trash. They have also been applied to the classification of paper stock fibers and to various kinds of paper stock screening and clarification with success. The excellent performance of these machines as screens is due to the fact that they combine an effective clearing action on the screens with an efficient centrifuging and screening action. Fiber fractionation may prove advantageous in board and other mills. For example, several grades may be produced from one furnish and used to advantage in various ways.

Present Old Paper Systems

For the benefit of any who may not be familiar with the Cowles Classifiner and Cowles waste paper systems, it is probably in order to say that the Classifiner is a machine which, up to this time, has been used principally in our waste paper systems for defibering, screening and centrifuging paper stock.[2]

The essential elements in a Classifiner are two disc screens of perforated metal. These are clamped parallel to each other in much the same way that the elements of a filter press are put together. This arrangement makes for simplicity of construction and facilitates opening the machine for inspection or renewal of parts when necessary. Stock is introduced through the center of one of the screens and spun by means of an impeller. Dirt fractions which are heavier than water, of course are centrifuged outward. Fibers and water pass through the screens. Scrapers mounted on the impeller prevent the screens from clogging. Coarse materials of about the same density as water, such as undefibered paper, either lodge on or rub along the screens, being held in close contact by the rapid flow through the screens. This rubbing in combination with the scraper action establishes a vigorous defibering and refining action. The degree of defibering or refining will, of course, depend upon the exact operating conditions. In the case of waste paper installations, the holes in the screens are generally rather large, (⅛ inch have been standard). Under these conditions fibers pass through the screens as soon as liberated by the defibering action, and no further work is done on them. This enables an efficient defibering action with comparatively little refining action on the fibers. Strings, rubber, cellophane, excelsior, hair, etc., accumulate in the space between the screens or on the screens but they are generally too tough to be broken up during the short time they are in the Classifiner. As mentioned above, heavier materials centrifuge outward in the case. Until recently, the practice was to continuously bleed off a small amount of rejected stock from the periphery of the space between the screens and trash was carried off in this stock, thus preventing undue accumulation in the machine. This rejected stock was diluted and strings and the like were then fished out of it in a device called a Cowles detrasher. The thin rejected stock, after leaving the detrasher, was then settled and returned to the inlet of the Classifiner, thus serving to dilute incoming stock to the required consistency and, at the same time, returning all paper fibers to the system.

Time-Operated Valve

The method of removing rejects or tailings has worked quite well but there was some difficulty in regulating the rate of withdrawal of this rejected stock. In some instances there were periods when there was an excessive flow of rejects and others when there was improper elimination of trash. In the former case, there was always some fiber loss and in the latter case, there was certain to be a loss of capacity and excessive wear on the screens and other parts of the Classifiner.

We now have a number of installations in operation where this trouble has been entirely corrected. This has been accomplished by a so-called time-operated valve which we have developed expressly for this purpose. This is a non-clogging valve of the Saunders-type, but fully automatic, with timing switch which causes the valve to open and close over any predetermined cycle. The object of the valve is to close off the flow of rejects for a period, during which time the undefibered materials are held in the case and subjected to a vigorous defibering action on the screens. Periodically this valve opens wide, discharging a full flow of tailings and completely scavenging the screening chamber. By controlling the time of the complete cycle and the open period of the valve, the amount of good stock which passes out with the tailings may be reduced to a minimum. At the same time, the flushing action provides against undue accumulations of tailings or rejected materials in the screening chamber.

It has been found preferable to operate the valve on a one minute cycle, with an open period of about five seconds. This open period may be set at will by a thumb screw control on the timing mechanism. It is necessary that some sort of a surge tank be used in connection with these pulsating valves to even out the flow. We recommend a small settling tank, perhaps five feet in diameter and five feet deep, with provision for removing settlings while the system is in operation. This will greatly relieve the burden on the main settling system in addition to providing a uniform flow of rejects. As a matter of fact, if the Classifier is operating properly and the settling tank is kept clean, additional settling capacity is hardly necessary..

Following this small settling, or surge tank, the stock is led to our detrasher and from there back to the Classifier, either directly or through a settling system as may be desired.

Improved Center Member

Another important improvement which has been made in the Classifiner for waste paper use has to do

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* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Member TAPPI, President Cowles Classifiner Co., Princeton, N. J.

[2] It is manufactured and sold by the Dilts Machine Works, Fulton, N. Y., under a license from The Cowles Company.

with the center member. The center member is a cast iron ring which divides the two screens and which forms the periphery of the screening chamber. The inner surface of this ring formerly was flat, with the result that there was a tendency for dirt, sand, etc., to work outward against the screens and pass out through them with the accepted stock. This inner surface is now recessed so that sand and all heavy particles which are centrifuged outward may be trapped and centrifuged in this recess until removed from the Classifiner. The outlet for rejects is also near the bottom of this member instead of at the top so that these heavy forms of dirt or trash are trapped out and the whole effect is to save wear and tear on the screens and on these center members, and at the same time, to improve greatly the clarification of the stock.

New Uses and Applications for Cowles Classifiner

Screening

Ever since the inception of the Classifiner idea, we have felt that a screening and centrifuging principle which was so efficient in a waste paper application could be applied to advantage to other screening problems as well.

Our theories have been based upon the reasoning that the Classifiner principle lends itself to designs which have the following inherent advantages:

(a) An effective centrifuging action with provision for a free flow of both heavy and light foreign materials, either inward or outward, so that they quickly leave the screening zone.

(b) A reduction of eddies and turbulence, by proper impeller design and close clearances, to improve the centrifuging action and power efficiency.

(c) With parallel disc screens made from one sheet of metal, it is comparatively simple to establish a positive scraper action on the screens. This improved clearing effect enables much higher capacity per unit of screen area and much higher consistencies are also practicable.

(d) Power economy, of course, follows higher consistencies as well as reductions in turbulence and eddies.

(e) By proper adjustments, the scrapers can be made to set up a refining action on the fibers which staple in the holes in the screens and this proves to be a valuable adjunct to the screening operation by reducing the power which is required for refining in other parts of the stock preparation process.

About two years ago, we designed a small vertical Classifiner with a central outlet around the shaft at the top for the removal of light tailings. The center member of these machines was recessed and provided with means for removing heavy tailings. The screens were 18 inches in diameter. We used these small Classifiners in various ways, first experimentally in our shop, and later in mills, for screening and classifying various grades of paper stock.

In many cases, screens having different hole sizes were used so that two grades of stock could be taken off simultaneously. The accompanying data, which was taken from some of these runs, will be found interesting, especially with regard to the obvious adaptability of Classifiners to fiber classification.

DATA RELATIVE TO EARLY RUNS OF VERTICAL CLASSIFINER ON GROUNDWOOD PULP SHOWING FIBER CLASSIFICATION RESULTS

Stock	Freeness (Can. Std.) cc.	Mullen (Pts./lb.)	Tear
Cowles 0.055	48	42.1	56.7
Cowles 0.070	94	37.7	63.1
O. F. 0.055	75	41.8	48.4
O. F. 0.075	88	41.2	59.4

The mullen and tear tests of both grades are within the range of the Oswego Falls grades. The freeness is lower and higher in our 0.055 and 0.070 stocks respectively, as compared to the O. F. 0.055 and 0.070 stocks. This condition indicates that the 0.070 screen drew off the coarse fibers and only the fine passed through the 0.055 screen.

Straw Stock Screening and Defibering

As has been previously mentioned, a pronounced defibering and refining action was noted during this work. This was particularly evident in the case of our straw stock runs. The trials were made in our shop and at that time we were not equipped to obtain accurate data. Nevertheless, the results were interesting. We found that we could furnish the cooked but unbeaten straw to a headbox equipped with an agitator and that the Classifiner would fully defiber this material although the capacity was, of course, materially reduced under these conditions. In one case, we operated continuously, withdrawing stock through the screens and adding water and unbeaten cooked straw at the rate of about one fifty-pound bag of wet straw (about 50 per cent water) every two minutes. Our power input was about 10 h.p. As this paper goes to press, this same Classifiner is being started up in the straw mill of the American Box Board Co., at Grand Rapids, Mich., and we will shortly have additional information on this subject.

Ground Wood Screening and Classification

During the past six months, with the kind cooperation of the Oswego Falls Corporation, we have been running some very interesting trials in its groundwood mill at Fulton, N. Y. In this case, it was decided to try a new idea. We took one of our regular 36 inch Classifiners and modified the center member so that the stock could be pumped in under pressure through a tangential nozzle at the periphery. In this manner we availed ourselves of the high efficiency of a centrifugal pump as being the most economical means of accelerating the stock in the Classifiner and of pumping or circulating it in our system. This also left the usual inlet of the Classifiner free to be used for the removal of tailings. In other words, the flow through the Classifiner was reversed. Provision was made for trapping out sand and the like at the periphery so that the freest possible means was provided for centrifuging tailings either inward or outward and removing them from the screening chamber. With this arrangement the only power necessary to drive the Classifiner was that which was required to overcome the frictional resistance of the scrapers and of the stock against the inner surfaces of the screening chamber. The impeller speed was calculated to be such that the tip velocity of the impeller would be the same as the velocity of the stock as it was nozzled tangentially into the screening chamber. The diameter of the impeller was 36 inches. It operated at 208 r.p.m. We calculated that the theoretical head on the nozzle which was necessary to supply an equivalent velocity of stock was about 22½ feet. To supply a margin, we obtained a pump through the kind cooperation of the Morris Machine Works, of Baldwinsville, N. Y. This pump was capable of operating at a head of 35 feet. It had a capacity of 1600 g.p.m. and required 25 h.p. under maximum conditions, although they can sup-

ply pumps which will give similar performance with less than 20 h.p. We use a 10 h.p. motor to drive the Classifiner, but not over half this power was actually required at any time.

At this mill three grades of stock are produced. This is accomplished by passing their stock through a series of three screens in accordance with the following table:

Grade	Product	Diameter of Holes in Pulp Screens	Freeness Required (cc.) (Canadian Std.)
1	Tissue	0.060	75
2	Board mill liner	0.075	175
3	Board mill filler	0.075	580

The high freeness of the No. 3 grade is due to the fact that this stock is mostly slivers which have been refined. We undertook to provide their No. 1 and No. 2 grades simultaneously by installing screens having 0.055 inch diameter holes on one side of the Classifiner and 0.070 inch diameter holes on the other. We connected to the mill's system and operated for about a week.

Figs. 1 and 2 illustrate the effect on groundwood pulp when screened through 0.055 and 0.070 inch perforated screens in the Cowles Classifiner. It can be seen that there are fewer slivers in the stock from the 0.055 screen than in that from the 0.070 screen. Furthermore, the classifined stock compares very favorably with corresponding stocks from the Oswego Falls screens. Blue grass tests indicated that Classifiner stock was at least equal to and in some cases, superior to the regular O. F. stock. On at least one run of bottle cap board, very encouraging results were obtained when classifined stock was introduced into the furnish. The paper machine was run at a speed 10 feet above standard. Porosity was up five points or better, stiffness was up an average of five or more points, and mullen went up about 25 points. These increases were believed due to the Classifiner to a large extent since its use was the only deviation from the standard procedure.

It should be noted further, that each of the rotary screens at that mill is run by a 40 h.p. motor while the Classifiner used only about 30 h.p. and was supplying two grades of accepted stock.

FIG. 1.

FIG. 2.

We established the fact that with the Classifiner as it stood, our screen area was sufficient for about 60 tons of stock per day under the prevailing conditions with about a 30 h.p. input and that the hook-up as we had planned it was entirely workable. We operated at about 1 per cent consistency which was the maximum we could obtain; a higher output might have been accomplished if a higher consistency had been available. As we operated, our indicated power was about 0.5 h.p. per ton of stock handled per day. The pump, was however, oversize for the quantity of stock which was actually screened, and also designed to operate at about 10 feet above the theoretical head, which we found to be unnecessary. As a result, we believe that when we get this development perfected, using a pump of maximum efficiency and in proper balance with the screen area and impeller speed, our power consumption will not be over 0.25 h.p. per ton of stock handled per day. We are continuing with this program and should have more to report within a few months. Meanwhile, we can say that the application shows a great deal of promise. We believe that the idea of using a special pump and nozzling the stock in at the periphery will be particularly applicable to our low consistency (1 to 1.5 per cent) screening operations where large tonnages are to be handled and where power is an important consideration.

Paper Machine Screening

Commercial applications for Classfiners have been carried furthest in new fields in paper machine screening applications. Last September one of our small vertical Classifiners was set up in the mill of the American Box Board Co., at Grand Rapids, Mich., and operated in place of a flat screen on a paper machine.

This machine operated without failure from the day that it started for seven weeks and it was then taken out of service only so that it might be available for trials in screening straw board stock, which have been previously mentioned. 0.078 inch diameter holes were used in the screens and the Classifiner was

VERTICAL CLASSIFINER STUDIES AT AMERICAN BOX BOARD CO., GRAND RAPIDS, MICH.

Classifiner installed on No. 5 Vat.

Date & Time	Source	Mullen	Schopper Freeness, cc.	Consistency, Per cent	Amps.
10/1/37					
9:30 A.M.	Inlet	...	48.5	1.005	9.5
	No. 4 Vat	18.2	55	....	
Filler stock	No. 5 Vat	19.3	57.5	....	
	Rejects	...	...	.965	
10/1/37					
2:30 P.M.	Intake	...	...	.885	9.25
	No. 4 Vat	18.6	61.5	....	
Filler stock	No. 5 Vat	19.6	64.5	....	
	Rejects	...	...	1.110	
10/5/37					
10:15 A.M.	Inlet	...	41.0	.516	11.0
	No. 6 Vat	26.5	42.5	....	
Sulphite top liner	No. 5 Vat	27.6	46.5	....	
	Rejects	...	...	.790	
10/6/37					
7:45 A.M.	Inlet	...	57.0	2.295	8.25
	No. 4 Vat	16.7	67.0	....	
Filler stock	No. 5 Vat	16.8	69.0	....	
	Rejects	...	...	2.14	
10/6/37					
4:10 P.M.	Inlet	...	58	2.62	8.5
	No. 4 Vat	...	64	....	
Filler stock	No. 5 Vat	...	66	....	
	Rejects	...	...	2.94	
10/7/37					
11:15 A.M.	Inlet	...	22	.648	9.25
	No. 6 Vat	44.2	20.5	...	
Kraft top liner	No. 5 Vat	42.5	24.0	...	
	Rejects	...	...	2.105	
10/8/37					
7:45 A.M.	Inlet	...	58.0	1.54	8.75
	No. 4 Vat	17.7	58.5	....	
Filler stock	No. 5 Vat	17.1	63.0	....	
	Rejects	...	...	1.675	
10/8/37					
12:45 P.M.	Inlet	...	59.5	1.45	9.25
	No. 4 Vat	18.6	59.5	....	
Filler stock	No. 5 Vat	19.1	63.0	....	
	Rejects	...	...	1.94	
10/9/37					
7:45 A.M.	Inlet	...	63.0	1.34	9.25
	No. 4 Vat	17.8	59.0	....	
Filler stock	No. 5 Vat	17.6	63.0	....	
	Rejects	...	...	1.39	

so connected that it could be used on both liner and filler stock during this trial, and at all times the screening job was considered superior to that which was being accomplished by the regular flat screen. As will be noted from the accompanying data, a marked increase in strength tests was also registered on stock samples taken before and after passage through this Classifiner.

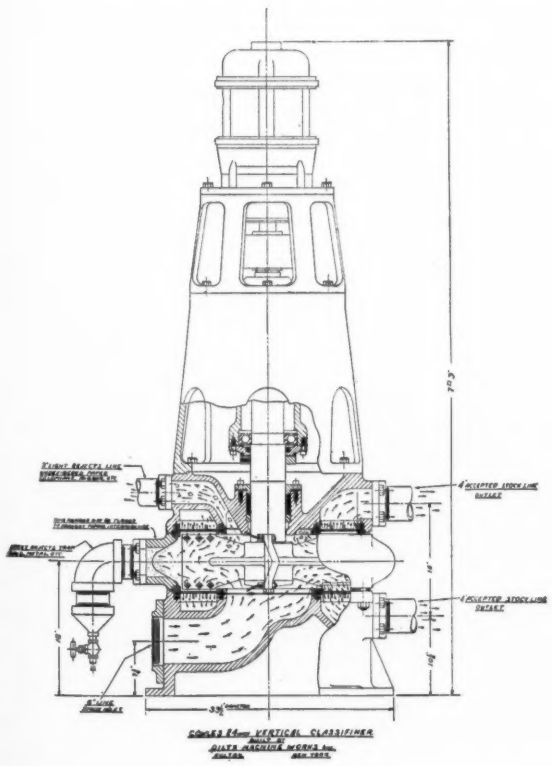

FIG. 3.

There was no material wear on the screens during this run of seven weeks. The machine operated at 550 r.p.m. and consumed an average of about 9 h.p It was equipped with two screens each 18 inches in diameter and it was estimated that it was handling about 15 tons of stock per day. At no time did it appear to be crowded for capacity. We have now brought out a vertical Classifiner (Fig. 3) which has been developed from our experiences with these early vertical machines. These new vertical Classifiners are very similar to the original ones except that they are more compact and rugged in design; the screens are 24 inches in diameter instead of 18, and the impeller design has been simplified and, at the same time, improved to provide for a more efficient centrifuging action. As machine screens, the new Classifiner may be run at much lower speeds. This is possible because they have an excess of screening area. Under these conditions, the screen life is greatly increased and wear and maintenance are reduced to a minimum. Power consumption also compares most favorably with that used by the usual flat screens. This model is recommended for capacities up to 50 tons per day, depending upon the conditions. The speed and power will, of course, increase with these higher ratings.

Miscellaneous

The foregoing is a brief description of what we have accomplished up to the time of writing this paper. We hope that this will encourage a general interest in our work and we will welcome criticism, suggestions, or inquiries, as we feel that we are still delving into a field where there are many opportunities, and where we still have much to learn.

At this time, we are doing a great deal of speculating. For one thing, the classifining of the shorter fibers seems to us to be a very simple problem. When we come to classifining the longer fibers, and when very fine screens must be used, the longer fibers can be worked through the screens, but of course, resist passage. The result is that there is a tendency to staple in the holes of the screens and the scrapers set up a refining action. Consequently, when we undertake to force the longer fibered stocks through screens which are fine enough to be used as paper machine screens, a certain refining action accompanies the operation. We do not yet know just how extensive this refining action is, or just what the power increase will be when very fine screening is required, but the Classifiner is efficient from the power standpoint. It seems to us that any refining which may appear during this operation should enable a sufficient reduction in power during the earlier stages of the stock preparation process, so that the net result will be a gain in favor of the Classifiner. The matter of fiber classification is a most interesting one to us, especially as it seems to us that there are a number of applications for such operations which are totally unexplored. For example, why would it not be advantageous in many mill operations, to produce several standardized grades of stock in this manner, perhaps from one furnish, and then refine or otherwise treat each grade separately so that these grades might eventually be blended, or used to meet vary-

ing requirements? As a further example, it would seem most obvious to us that in the production of board on a cylinder machine, three grades of stock might be regularly prepared from any standardized furnish. It would then seem natural to send the shortest fibers to the vats which make the center ply, intermediate fibers to the intermediate plies, and the longest fibers to the outer plies. It appears to us that such a plan would enable better formation, higher machine speeds, increased strength, improved bending and a cheaper furnish. On the other hand, in a mill having several machines making several grades of board, stock might be made in one stock preparation system, and distributed or blended to the various machines in any manner which would produce the required results to the best advantage. Carrying this thought a step further, it is obvious that the short fibered grades will naturally come through fine screens, and will be well defibered and screened. It may be that grades of this character will not need any further refining action. If so, this stock could be led directly to the vats or paper machines without any further treatment. There would, of course, be no reserve supply with which to keep the machine running in case of a failure in the stock preparation system, but it seems to us that this could be overcome by having stand-by equipment which could be started up at a moment's notice, and that the other economies in such a layout would more than off-set the additional cost of this stand-by equipment. We speak of these board mill applications as seeming to be obvious places where such ideas might be worked out to advantage, but we feel that there may be a good many others of equal importance.

Two and One-Half Centuries of American Papermaking*

By William Bond Wheelwright[1]

When the Reverend Jose Glover sailed from England in 1638, bringing the first printing press to the American Colonies, there were no paper mills in the New World. Perhaps the good man, who died during the voyage, had brought aboard "The John of London" a few packages of English hand-made paper.

Fifty-seven years later, when William Bradford migrated to Philadelphia at the age of twenty-two, to establish the first press in the middle colonies, there was still no paper being made in America. The United States is the only great nation in the world where printing has preceded the art of paper-making!

Possibly Bradford deserves to be considered the patron saint of American paper-makers: It was he who formed a partnership in 1690, with William Rittenhouse, an experienced paper-maker, forty-six years old, who had learned the trade in Holland. It was due to Bradford's social and business connections that the project was financed, for associated with Bradford and Rittenhouse were three men of means, Samuel Carpenter, Robert Turner, and Thomas Tresse.

The pioneer mill was established in 1690, near Germantown, on the banks, it is believed, of Paper-Mill Run, a small stream which empties into the Wissahickon, about two miles above its junction with the Schuylkill River. The probable site is fortunately preserved somewhere in beautiful Fairmont Park, although unidentified and unmarked.

The house where William Rittenhouse and his son Claus lived still stands. But the tablet affixed was designed to commemorate it as the birthplace of David Rittenhouse, and is inscribed as follows:

This house was built 1707
Here was born April 8, 1732
DAVID RITTENHOUSE
Astronomer and Mathematician
He was Treasurer of the State of Pennsylvania
1777-1795
Director of the United States Mint
1792-1795
President of the American Philosophical Society
From 1790 to his death in 1796
Near this site in 1690
WILLIAM RITTENHOUSE
Built the first Paper Mill in America

According to Dard Hunter, "The buildings usually pictured as the Rittenhouse paper mill are two stone houses that are still standing. The larger of these structures was built in 1707, and was originally the home of William Rittenhouse and his son Claus, there being carved in the stone above one of the windows the inscription $\frac{C\ W}{1707}\ P$ This picturesque old stone house, with its steep, narrow, winding stairway and small, cheerful rooms, is always pictured as the Rittenhouse paper mill, but was used only as a residence, never as a mill. To the public at large this low, two-story structure is better known today as the birthplace of David Rittenhouse, the astronomer, than as the home of William Rittenhouse, the pioneer paper-maker. It may be said without hesitation that

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[1] Member TAPPI, Editor, Paper and Printing Digest, Chicago, Ill.

Photo by C. V. D. Hubbard *© W. B. Wheelwright.*

THE HOME OF WILLIAM AND CLAUS RITTENHOUSE
Now marked with a tablet in commemoration of its having been the birthplace of David Rittenhouse, "astronomer and mathematician", with only incidental mention of William Rittenhouse.

nothing remains of the actual Rittenhouse mill, either the building or the equipment. Indeed, even the spot where the mill stood is unknown, nor will it ever be possible to trace with certainty the exact location."

Rittenhouse gradually bought out one partner after another, and by 1704 was the sole owner of the paper mill. The first contract for paper on record in America, is an agreement between him and Bradford dated 1697, in which it was agreed to deliver in Philadelphia, "ye full quantity of Seven Ream of printing paper, Two Ream of good writing paper and two Ream of blue paper, yearly and every year during ye sd. Term of Ten years." The prices were specified for the entire period—including "ye refusal of all ye printing paper . . . at Ten shillings per ream . . . writing paper to be at 20s and brown paper at 6s per ream."

The double price of writing over printing paper was doubtless occasioned by the necessity for sizing, by dipping the sheets by hand into animal size, whereas printing paper was unsized. Not only was paper-making a monopoly of the first American papermaker, but the paper market was thoroughly cornered by this shrewd Philadelphia printer, at a fixed price for the term of ten years! In spite of this early example of "rugged individualism," who can say that America is not really indebted to Rittenhouse and Bradford for their initiative?

An Interesting Coincidence

By an interesting coincidence, the year 1940 is to be celebrated in many parts of the world as the accepted, though unproven date, of the invention by Guttenberg of printing from moveable type. This observance of the 500th anniversary of printing in Europe, should be synchronized in America with suitable ceremonies in honor of the beginning of Colonial paper-making. It must be considered that American paper-makers are lacking in appreciation and pride of their industry if no appropriate action is taken.

Recognition of Paper Landmarks

American historians so accustomed to having paper easily at their command, have failed to pay tribute to the art of paper-making, or so far as we know, to have heeded its inception and progress. The significance of paper did not, however, escape the attention of H. G. Wells in his Outline of History. "One item in this account," said he, "must be underlined here because of its importance in the intellectual life of mankind, the manufacture of paper."

He points out that the museum and library at Alexandria, once the world's center of culture, "were a centre of light, but it was light in a dark lantern hidden from the world. There were no means of carrying its results even to sympathetic men abroad except by tedious letter writing. There was no possibility of communicating what was known there to the general body of men . . . It was the introduction of paper from the East that made practical the long latent method of printing. It is still difficult to assign the honor of priority in the use of the simple expedient of printing for multiplying books. It is a trivial question which has been preposteriously debated . . . Far more important is the question of the manufacture of paper. It is scarcely too much to say that paper made the revival of Europe possible. Paper originated in China where its use probably goes back to the second century B. C."

The date accepted in the annals of the Later Han dynasty for the invention of paper from "tree-bark, or bast fiber, hemp, and also rags and fishing nets for making paper, is according to Berthold Laufer's *Paper and Printing in Ancient China*, "A.D.105." It is pointed out in this interesting monograph that the emperor lauded the skill of Ts'ai Lun who submitted his invention to him. "From this moment there was no one who did not use his paper, and throughout the empire, all people called it the " 'paper of the honorable Ts'ai.' " The importance of his invention was recognized by the empress who ennobled him as marquis.

In Japan, paper is also reverentially regarded. Dard Hunter tells us that "the name for paper mulberry, *kozo*, means "God's Raiment." At Okamato a most impressive sanctuary was dedicated to the ancient craft of paper-making. In Najio stands a dignified monument dedicated to the pioneer papermaker of the village. In memory of Mochizuki, who established a paper mill in Hishijama-mura in 1572, a Japanese artist painted the imaginary portraits of Ts'ai Lun, and Doncho, the Korean priest who introduced paper-making into Japan, in company with Mochizuki.

Does it not seem strange that in the United States, where over half the paper of the world is now produced, no monument should have yet been raised to honor our pioneer paper-maker William Rittenhouse? Is it not time to plan appropriate observances and memorials to celebrate the 250th anniversary of paper-making in America?

Existing Markers

If such a worthy plan should now be made, it should include other great mile-stones in the progress of this important industry. At present we know of only two markers on the historic spots of American paper-making. The earlier of these is a small tablet inconspicuously placed near the site of New England's first paper mill at Milton, Mass. The other can be found at the turn of a road in Stockbridge, Mass., near the Interlaken postoffice, formerly known as "Curtisville."

Below the street-level, close by a stream, stands a small, square stone structure, housing a well-worn grind-stone, above the aperture the observant passer-by may discover a bronze plaque bearing the inscription:

THE FIRST WOOD PULP MILL
IN THE UNITED STATES WAS
ERECTED ON THIS SITE BY
ALBRECHT PAGENSTECHER
IN 1866
THE PULP GRINDERS
IMPORTED FROM GERMANY
WERE INSTALLED BY
FRIEDRICH WÜRTZBACH

So far as we are aware, this is all that has yet been done publicly to commemorate the achievements of American paper-makers. Yet in many of our States the sites of important inventions go un-noticed. Before many years it may be impossible to identify them. The interesting Crane Museum at Dayton, Mass., is a commendable family memorial.

The First Cylinder Machines

Only to mention a few of the names and places which are deserving of markers there are: The famous Gilpin Mill, near Wilmington, Del., founded in 1787 by Joshua and Thomas Gilpin. Here the first

American-made cylinder paper machine was installed in 1816.

At Springfield, Mass., might be located the site of the firm of D. and J. Ames. John Ames also built a cylinder paper machine in 1822. Whether these machines were copied from Dickinson's invention of 1809 is not entirely certain. It would not diminish their importance if they were.

The First Fourdriniers

There are two claimants to the distinction of having installed the first fourdrinier machine in 1827. Henry Barclay is said to have the priority at the mill of Beaech, Hommerken & Kearney at Saugerties, N. Y., by Horace Lyman Weeks, but according to the Smith & Winchester Manufacturing Company, George Spafford set up the first imported machine at North Windham, Conn., for Joseph Pickering, in December, 1827. Certain it is that Spafford formed the firm of Phelps & Spafford to build the first American fourdrinier in 1829, which was erected at Norwich Falls, Conn., for Amos D. Hubbard.

The United States was dependent on imported endless paper-machine felts and fourdrinier wires well into the 19th century. In 1847 William Staniar wove the first wire (sixty-two inches wide by twenty-four feet long) at Belleville, N. J., and the first endless felts were made in 1864 at Camden, Maine.

The First Wood Pulp

An imporant era was begun when Hugh Burgess made the first American soda pulp, in the Warren mill of Marylandville, Pa., about 1856. Not long after, Benjamin Tilghmann working in Philadelphia discovered the process for making sulphite pulp, although he was unable to produce it commercially. This remained for Fry and Ekman, to achieve in Sweden, but the American rights were obtained by Charles S. Wheelwright, who with the assistance of Arthur D. Little as chemist, and John Luke as superintendent produced a high quality of sulphite pulp at the Richmond Paper Company mill in East Providence, R. I., in 1882.

Other epochal dates are the first making of sulphate pulp at Muskegon, Mich., in 1909 and the first use of Southern pine for sulphate pulp at Orange, Texas in 1911.

The recent achievements in the development of the use of Southern pine are too vivid to need recalling. Some day they are likely to loom prominently in the history of paper-making in the United States.

Museum of Science and Industry

These and other notable achievements too numerous to mentain should be matter for local, if not national pride. But there is one project which should not be overlooked, in case the American paper industry becomes aroused to the significance of its 250th anniversary. We refer to the opportunity soon to become available, of assembling a comprehensive permanent exhibit of paper and paper-making at the Museum of Science and Industry in Chicago.

Not everybody is aware that the old Fine Arts Building of the Columbian Exposition, described by Augustus St. Gaudens as "the finest thing done since the Parthenon," has been rebuilt of steel and stone to become presently the world's greatest museum of science and industry.

Waldemar Kaempffert gives us this impression of the new Museum. "Enter the main doorway today and pass into the first court. You see—what? Animation everywhere. Many of the machines have push-buttons and levers. Push the buttons and pull the levers. Let the wheels spin around. Here is a gyroscopic turntable that transports you to a realm where forces different from those of ordinary life produce queer effects. Abrasives are exhibited on this side of the court and chemical reactions are demonstrated on the other. There are X-ray machines, electric generators, a score of machines for different industrial uses, all so mounted that their operative principles may be studied. Yonder is a tank in which a diver is cutting steel under water.

"Farther on in the south court loom the head frame of an Illinois coal mine and a mine hoist that hauls up and lowers down a cage counter-balanced by a coal skip. These are not imitations but originals. And they work here just as they once did at the top of a shaft . . . The cage seems to drop a distance of 500 feet . . . There is a blast of cold air and a musty smell—both inseparable from coal mining . . . At the bottom of the shaft you step out." The visitor enjoys the illusion of seeing a coal mine in action, step by step. "Out by way of a temporary exit stairway and you find yourself on the main floor of the museum again."

"Nowhere has the drama of man's social advance with the aid of science and industry been thus set forth. The staging of the drama, the unfolding of the action through 50,000 years, the revelation of the old stone-hatchet wielder of neolithic times as the creator of an artificial environment of a new culture—this is to be one of the museum's major contributions to the interpretation of the machine."

This brief excerpt from Kaempffert's graphic description can give but a slight hint of the complete museum. Already the graphic arts exhibit is well under way. Next to it is the space tentatively reserved for paper. Adjoining it are to be chemistry and forestry. A logical sequence in a wonderful setting, it cannot be complete without paper.

While the Museum provides free space and superintendence, it cannot supply the estimated millions worth of exhibits it will ultimately care for. If the paper industry in common with other great enterprises wishes to be represented it must do its part.

Recommendations to TAPPI

It is the unanimous feeling of your History and Biography Committee, that the Technical Association of the Pulp and Paper Industry, recognizing the importance of the historical anniversary only two years hence, should form a committee with two objects in view. One, the erection of suitable markers at important historical sites of paper-making, and the other to confer with the authorities of the Museum of Science and Industry looking toward the creation of a permanent visualization of the industry in the Museum. Here is our opportunity to commemorate the accomplishments of the inventors and builders of the greatest national paper industry on the face of the globe. At the same time we will be doing ourselves as well as the public a service, in graphically showing the usefulness—indeed the positive essential need of paper in the conduct and progress of civilized human life.

G. G. Cobean Heads Paper Trade Association

The Thirty-fifth Annual Convention of the National Paper Trade Association of the United States was held at the Waldorf-Astoria Hotel, February 21 to 23 inclusive. The several important divisional meetings reported large attendances. At the annual meeting held on Wednesday the following officers were elected:

The New Officers

President, George G. Cobean, J. W. Butler Paper Company, Chicago; vice-president in charge of Wrapping Paper Division, Finley F. Jamison, Interstate Cordage and Paper Company, Pittsburgh; vice-president in charge of Fine Paper Division, Percy D. Lesh, C. P. Lesh Paper Company, Indianapolis; treasurer, Charles W. Vernon, Vernon Brothers & Co., New York; secretary, A. H. Chamberlain, 220 East 42d street, New York.

At the opening session on Monday, several interesting addresses were made among which was that of George H. Mead, president of the Mead Corporation, who spoke on "Business and Citizenship". Harold L. Zellerbach, Zellerbach Paper Company, San Francisco, spoke on the "Price of Leadership". Other informal talks enlivened the first meeting which was largely attended.

J. K. Javits Speaks

The ability of small business to cope with the competition of big business was stated to depend not upon restrictive laws but upon the cooperation of small business through trade associations by J. K. Javits, of Javits & Javits, counsel for the National Paper Trade Association of the United States, Inc., at its annual convention at the Waldorf-Astoria Hotel yesterday afternoon, in an address entitled "Big and Small Business and Trade Associations".

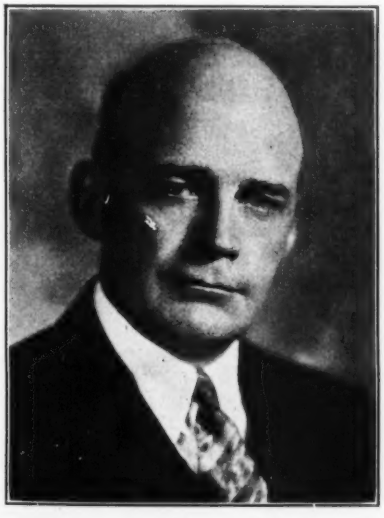
Mr. Javits asserted that there were two types of big business, one type resulting from efficiencies in production or distribution or from other good economic reasons and another type which was created "as a vehicle for ill advised financings." These, he said, were "put together merely to create great size so that bonds and stocks could be floated upon the strength of their assets, although those assets bore no sound economic relation to each other, and formed no sound economic basis for serving the public interest together, better than they did separately.

"It is to a large extent these aggregations of bigness which have sought, not out of immorality in most cases, but out of sheer necessity to distort our whole economic scheme in order to maintain their existence," he added.

"History teaches that laws very rarely solve basic economic problems, that they are solved only by the pressure of human or economic forces. I believe that it is incumbent upon small business, therefore, if it wishes to preserve itself, to demonstrate that its existence is economically sound, and that it is serving the public interest in such a way as to be entitled not only to preservation but to progress and to a substantial share in the national income," Mr. Javits continued.

He pointed out that through cooperative action in trade associations small business could meet big business on an equality in three of the major points which are claimed to give big business an advantage. He stated that these were (1) better information on general conditions in the trade or industry, (2) the ability to diversify products and to serve diversified markets, and (3) the means for research to discover new products and new methods of production and distribution.

In respect to these Mr. Javits said "Certainly, in the case of the first and third, small business men may, by cooperative action, obtain the same benefits which big business obtains and frequently at lower costs. With respect to diversification of products and markets, this can be counterbalanced by the small business man through his closer connection with a particular market and, therefore, his ability to obtain from that market whatever business exists, even if only upon his limited types of output. In other words, if business is poor it is the small business



GEORGE G. COBEAN, President

A. H. CHAMBERLAIN, Secretary

man who should garner locally most of the available business provided that his operations are efficient.

"We have already named some of the difficulties under which big business must labor: first and foremost, of course, is the problem of management and of getting employees in a large enterprise thoroughly devoted to the task in hand. Second, and also connected with management, is psychological detachment from local markets and local problems; and last, are the problems raised by financing and public relations on a large scale, including relations with government and labor."

Mr. Javits also asserted that the continued existence and active functioning of trade associations was of vital interest to big business as well.

"You must recognize," he said, "that for big business to meet an unfair competitive situation is expensive by as many times over as any big business is greater than its smaller competitor. You must remember, too, that big business cannot cut corners, that its very size impairs seriously its flexibility, and that it must conform to practically all established trade practices without the possibility of much variation, whereas, the small business man retains much more flexibility in that regard. Trade association activity protects big business as against imposition; on the other hand, by trade association activity big business is frequently restrained from using its great economic power to achieve a result very damaging to small competitors. Big business may live through a period of demoralized markets although it may not like it; small business must perish at the wayside; as a result the period may be temporary for big business, but permanent for small business."

In considering the methods by which government can help trade associations better to make the cooperative action of small business, and the cooperation of big and small business, effective, Mr. Javits outlined a plan for the amendment of the anti-trust laws.

"There has been and continues to be considerable discussion respecting efforts to amend the anti-trust laws in order to make them more specific. I believe that the anti-trust laws would not need such amendment were government and business both cooperative enough and enterprising enough to develop for submission to the courts controversies which could produce practical methods of trade and industrial cooperation to realize the objectives which both have. The very generality of the language of the anti-trust laws makes such action possible. The anti-trust laws express a public policy, administration within that policy can be modified as conditions are modified and that is the most helpful way.

"However, we must deal with realities, and realistically it seems impossible to get government and business to take forward steps in this regard. If we are to consider legislation therefore let us consider such legislation as will be most closely related to the idea of flexibility rather than to the idea of rigidity."

"Such legislation must be based upon contract rather than upon compulsion. In the first place contracts are generally entered into by business men and are, therefore, in their approach and language better understood by them. In the second place, the variations of contracts to meet the conditions of different trades and industries is far more suitable for the purpose than rigid statutory enactment. Lastly, business men are accustomed to observe contracts and there is far more chance of honest compliance with the terms of contracts than there is with the terms of statutes."

"As a concrete proposal Congress can, by legislation, grant immunity from the Federal anti-trust laws to the members of any trade or industry engaged in interstate commerce when they are complying with the provisions of agreements not to engage in specified unfair methods of competition or unfair commercial acts or practices. Such agreements should be made subject to the approval of a governmental agency and such approval should protect the participants so long as they comply with the terms of the agreement in good faith. The unfair methods of competition and unfair commercial acts and practices which these agreements forbid should be confined specifically to that which is unfair, fraudulent or tricky. Within these limits many of the most important aims of trade associations may ultimately be realized.

"The provisions of such contracts to the extent that they prohibit unfair methods of competition or unfair methods or practices in commerce should be binding upon competitors who do not enter into the contracts. In order to make this prohibition effective such contracts would have to be entered into by a substantial majority of the members of every trade or industry affected. It can then be said that if the organized conscience of that trade or industry is as expressed in the contract it is the legislative policy of the United States that that conscience shall obtain for all members of that trade or industry.

"It should also be possible to include in such agreements various other provisions upon which groups may wish to agree dealing with general industrial planning and industrial cooperation but those provisions should not be binding upon a minority not wishing to enter into the agreement. The agreements should run for limited periods not exceeding two years and should be terminable during that time at the election of a substantial proportion of the contracting parties. It may well be, too, that as a condition for allowing the latter class of provisions in agreements standards of minimum wages and maximum hours should be required.

"In some trades or industries the facts may warrant the establishment of minimum wages and maximum hours, the violation of which would constitute an unfair method of competition or an unfair act or practice in commerce, and therefore be binding on the minority not a party to the agreements, as well.

"To further strengthen this legislation Congress should provide that all Federal government purchases should be confined to members of trades and industries entering into and adhering to contracts in effect in their particular trades and industries. This movement through money grants which the Federal government makes to States and municipalities for relief and other purposes, should be encouraged to spread into States and municipalities, and through the immense purchases made by government itself should have a profound effect upon the whole business world. One of the most effective methods of enforcing the NRA Codes was through this power of government to purchase or refuse to purchase from various persons. Unfortunately during NRA days the government exempted itself from the provisions of Codes and thus contributed to their flagrant violation in other respects. Here would be an opportunity for the government to help business to put its house in order."

Refining of Semi-Chemical Pulp Sulphate Tailings and Sawdust

Years of research and practical co-operation with progressive mills have resulted in various modifications of the Haug refiner, each one designed and developed to accomplish the desired purpose.

Groundwood Tailings

One construction will make a fine fibry pulp from groundwood tailings which is free of slivers and bright in color, with the dirt so well worked up that the refined pulp is so free of specks that it may be mixed with the regular paper machine furnish. This method is most economical for ground wood mills because a uniform grade of fine pulp can be made for 8 to 10 HP per ton on this refiner. This has enabled several mills to increase their grinder production and to lower their total grinder horsepower.

Another arrangement will make good long-fibered pulp with about 10 to 12 HP per ton but if there is any dirt in the tailings it will not be worked up finely enough and will have to be removed with screens and rifflers or centrifuges.

Semi-Chemical Pulp

Still another construction handles semi-chemical pulp reducing the chips to a stock which has peculiar jordaning properties. The result is a stronger and cleaner paper. The gentle action of the Haug produces fiber bundles, unbroken longitudinally but ready to come apart. The refining in the Haug apparently strengthens the fibers and hydrates them so they will withstand the jordaning operation.

Sawdust

Another construction takes the sawdust from the wood room. In one of the new mills in the South, Haug-refined sawdust is added to the paper machine furnish and increases the strength and stiffness of the sheet.

Sulphate or Kraft Tailings

A further modification refines the tailings from sulphate mills to a better and stronger pulp.

The many years of research and development have also brought about a simplified and sturdier construction with the result that the up-keep of these machines today is extremely low and they can be operated and cared for by the regular mill help.

The power savings alone will insure the return on the investment within a year or less while the beneficial effect on the paper quality because of the clean and strong refined stock, will make itself felt in better business immediately.

RECENT INSTALLATION OF HAUG REFINER

Wage and Hour Regulation in Industry

Allen W. Rucker, president of the Eddy-Rucker-Nickels Company, in his recent book "Labor's Road to Plenty—The Return to the American System of Productivity," analyzes the effects upon labor, industry, and the economic life of America of the governmental and union wage-hour regulation which has dominated a half-score of great American industries during the past 15 years. Using as his sources of information the records of the U. S. Treasury, the U. S. Census of Manufacturers, and other Federal fact-finding bodies, he also attempts to show the end-results of such regulation in over 30 other major industries and in 21 chief industrial states, both during the boom of the 'twenties and the depression of 1930-35.

The work, selling at $2.50, may be procured directly from the publishers, L. C. Page & Co., 53 Beacon street, Boston.

Latex and Its Industrial Applications

LATEX AND RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS. By Frederick Marchionna. The Rubber Age, 250 W. 57th St., New York, 1937. 2 Volumes. Price $20.00.

The paper industry has shown a keen interest in latex and its applications in conjunction with paper ever since the work of Kaye on the addition of rubber latex to pulp prior to the formation of a sheet on the paper machine. The literature on rubber latex has grown to enormous proportions so that it would be extremely difficult for the individual investigator to locate desired information without the aid of such an indispensable key as the present volumes provide.

These two volumes bring up to date the bibliography of patents and published literature which appear in the volume "Latex and Its Industrial Applications" published in 1933 by the same author. In addition there is a complete new section devoted to rubber derivatives and their industrial applications.

The recent growth of the literature relating to latex and rubber derivatives has been so stupendous that it requires two large volumes totalling nearly 1700 pages to cover the period from June 1932 to January 1937.

Part 1 of the present work contains 17 chapters devoted to latex and its industrial applications. Part 2 contains 5 chapters devoted to rubber derivatives and their uses.

Concise and very informing introductions are given at the beginning of each chapter. These introductions are followed by very thorough, reliable and complete abstracts of United States and foreign patents, as well as abstracts of the important literature on the particular subject. Chapter 1 relates to latex and its properties. The next chapter contains an introduction written by John McGavack on conditioning latex such as by concentrating, creaming, coagulating, etc.. Dr. Schidrowitz, an expert in this field, has contributed an introduction on vulcanized latex and methods, also an introduction to Chapter 4 on compounding and compounded latex. The deposition of latex and dipping is covered in the next chapter with an introduction by C. L. Beal. Chapter 5 deals with rubber threads manufacture containing a brief introduction by D. F. Twiss.

The next few chapters deal with paper and artificial leather (an introduction by Geo. A. Richter and M. O. Schur), temporary protective coatings (ntroduction by a Szegvari), electrical insulation, porous rubber products with an introduction by D. F. Twiss, floor and road coverings, and shoe manufacture.

The second volume contains abstracts on rubber powders which is a very interesting and promising new field in rubber technology. A chapter is devoted to packing, abrasive, friction lining and other miscellaneous articles. Chapter 16 deals with latex produced artificially. Chapter 18 on electrodeposition of rubber contains an introduction by C. L. Beal.

Part II of this work deals with rubber derivatives. An excellent chapter on the composition and structure of the rubber hydrocarbon is written by Harry L. Fisher which gives 89 citations to the literature. An introduction by L. B. Sebrell and E. J. Morris on rubber derivatives contains 160 citations. Separate chapters are devoted to oxidized rubber, hydrogenated rubber, halogenated rubber, cyclized rubber and rubber condensation products.

The section on rubber derivatives is particularly valuable and timely since there is at present a great deal of interest in this field, many new developments being made in quick succession. The abstracts in Part II go back to the earliest known references so that for the first time a complete and very useful bibliography is made available to workers in this field. Since there is no very definite Patent Office classification for locating patents on rubber derivatives this section will be very valuable to research workers who wish to locate desired information.

These two volumes contain about 4,000 abstracts, the abstracts being serially numbered and continuing the series of the first volume published in 1934. The typography, classification and arrangement are excellent. The volumes are durably bound for constant usage. A detailed subject index is given including an author index, patentee index, numerical lists of United States, British, French and German patents.

Mr. Marchionna, who is an Examiner in the United States Patent Office, deserves considerable credit for his unusual energy and initiative in publishing these volumes, thereby offering a convenient and indispensable key to a rapidly growing literature which would be otherwise extremely difficult to locate by the individual searcher.—JOSEPH ROSSMAN.

Johns-Manville Covers Dividend

Johns-Manville Corporation's profits for the first quarter should approximate the regular quarterly dividend payment of 75 cents a share on the common stock, based on an estimate that sales of the company are down 25 per cent this year as compared with the first period of 1937. In the first quarter last year $1.05 was shown on the common.

The company has not yet published its 1937 report, but it is expected that profits of between $5.25 and $5.50 will be shown on sales of about $55,500,000. In the first nine months Johns-Manville reported $4.94 for the common stock.

Johns-Manville did not feel the recession until later in 1937 than most industrial corporations, but when sales did begin to drop they fell sharply. This was chiefly because of the continuation of a low steel production rate, which dried up steel mill improvements; of poor car loadings, which had the same effect on railroad buying, and of the failure of building to improve.

Business of the company at the moment is somewhat better than a month ago.

Sutherland Paper Co. Elects Officers

All officers and directors of the Sutherland Paper Company were re-elected at the annual meeting held February 14, 1938. A satisfactory operating year was imported, showing a 10 per cent increase in net sales over 1936 and a 24 per cent increase in the pay roll over 1936. In his import President L. W. Sutherland expressed optimism for the 1938 prospects. First declaration of dividends for this year is for forty cents a share payable March 14. Officers re-elected were President L. W. Sutherland, Vice Pres., and Secretary F. W. Sutherland, Vice President A. J. Young, and R. E. Rutledge, Treasurer W. Race. Directors are E. W. Chase, L. M. Crockett, Dr. L. H. Dewitt, F B. Eilers, C. H. Farrel, W. J. Lawrence. E. A. McQuade, O. F. Miller, W. L. Otis, R. E. Rutledge, F. W. Sutherland, L. W. Sutherland.

Central Paper Co. Prefers Older Men

It's an age of youth in industry but there's one factory here says The Chronicle, of Muskegon, Mich. that gets along without the touch of youth. It's the Central Paper Company employing around 500 workers with an output for the fiscal year, ended last July, valued at more than $2,500,000.

They say a factory worker is through at the age of 40 years, certainly at 45. When employment hit an all time peak here last spring and summer, nearly all those left on WPA rolls were over 40 years. At the Central Paper Company, a man is just beginning at 45 and some stay on the job until they reach 80 years.

In fact, one veteran, Charles Borgeson, was still on the payroll when he died in December at the age of 84 years.

Perry Cottrell, employment manager at the Central Paper Company, who is 66 years old himself, reports more than 40 men there are between 50 and 79 years of age some of whom—Mr. Cottrell is one—started with the company back in 1900. One lusty oldster, Albert Zahrt, 2520 Harding was once coachman for Eugen Meurer, organizer of the company.

The average age of the force at the Central Paper Company is estimated by C. W. Smith, general manager, at 47 years and he said he prefers to hire married men with families who are at least 35 years old. When Mr. Smith hangs out the 'help wanted' sign, he should add: "No young men need apply."

"We prefer older men," he said, "because we have found that they do the work just as well, take a greater interest in their jobs, are more contented and there is a much smaller labor turnover. Since I have been manager, we have had no trouble with the men and don't expect any."

Summing up his personnel requirements, Mr. Smith said he prefers men over 35 years old with families, or married men over 35 years without family who are permanently located here. Most of the young persons on the payroll of the Central Paper Company, he said, are relatives of old employes.

American Writing Buys Shartle Beater

President Leon Yoerg of the American Writing Paper Corporation, announces the purchase of a breaker-beater to be installed in the Gill Division of the corporation at a cost of $40,000. President Yoerg describes the new purchase as one of the most important the company has made since its organization last year. The breaker-beater has been ordered from the Shartle Machine Company of Middletown, Ohio.

For some time past, arrangements have been under consideration for the housing of all executive branches of the corporation in the main offices at Main and Canal streets and the last of these moves has now been made, Mr. Yoerg states. It is expected that it will make for greater efficiency.

Crinkled Paper Manufacturers Association

J. E. Rothermel directed the discussions of the informal get-together of the Crinkled Paper Manufacturers Association which was held this Monday, February 21, at the Waldorf-Astoria. This is the first time that the group has met in several years.

Crane Co.'s New Bar Stock Valves

Three new bar stock valves which have uses in almost every industry are being introduced by Crane Company, Chicago. These small 3,000 pound W.O.G. plug type disc, globe and angle valves are called bar stock valves because their bodies and bonnets are made from solid bar stock. They are considered ideal for connections on orifice meters, regulator leads, by-passes, gauges, for use as expansion valves on ammonia lines and for many similar services where accurate regulation of flow is desired or where parts of measuring instruments must be protected against the sudden release of high pressures.

The Exelloy valves are particularly suitable for handling oil or gas containing sulphur compounds or for installatons where steel valves do not have sufficient resistance to atmospheric corrosion.

The 18-8 alloy valves are especially suited for oil and gasoline containing hydrogen sulphide or sulphur dioxide when moisture is apt to be present.

All of these valves may be packed when wide open when under pressure. They are furnished either in steel, Exelloy or 18-8 chrome nickel alloy.

The new globe valve, No. 222½, is made with male and female ends in sizes ⅛ to ¾ inch inclusive. It is considered especially convenient where it is desirable to screw the valve directly into equipment having a female opening, thus eliminating the need for a nipple. Sizes ⅛ inch and 1 inch also are being added to the existing Crane line or bar stock valves known as Nos. 222 and 223. Crane bar stock valves, therefore, now include the globe and angle patterns with female ends in sizes ⅛ to 1 inch inclusive, and the new globe pattern with male and female ends mentioned.

Brunswick Plant Ready to Start

Officials of the newly constructed Brunswick Pulp and Paper Company plant of Brunswick, Ga., expect to begin full-time operation within the next few days.

Several experimental runs of pulp have been made and the entire personnel of the company has been hired. More than 200 workers, excluding those in timber operations and transportation, are employed.

The company is a subsidiary of the Mead Corporation of Chillicothe, Ohio, and the Scott Paper Company of Chester, Pa. The Mead Corporation manufactures paper for books, magazines, boards and writing. The Scott Company manufactures tissues and tissue towels. The product of the Brunswick plant will be used both for the tissues and the other papers.

U. S. Envelope Declares Regular Dividend

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, February 21, 1938—The United States Envelope company declared the regular semi-annual dividend of $3.50 a share on preferred and $2.50 a share on common stock, payable March 1. Treasurer William O. Day has submitted a statement to his directors showing net income of $741,685, before depreciation of $313,050 on plant investment, leaving profit of $428,634 to transfer to surplus. These figures are as of December 31, 1937. Comparisons with 1936 show net income of $789,943 before depreciation allowance of $316,305 and $470,637 to surplus. The surplus account at the end of 1937 is $2,029,521, as compared with the previous figure of $2,063,598.

Michigan Superintendents Meet

KALAMAZOO, Mich., February 21, 1938.—The February meeting of the Michigan Division of the American Pulp and Paper Mill Superintendents Association was held at Park American Hotel on February 17 at 7 P. M., with forty present. The usual jovial atmosphere which always prevails at these meetings was absent. All had on the previous day, attended the funeral of their beloved fellow member "Mike" Redmond whose sudden death on February 10th had shocked the entire membership. Due to inclement weather Chairman Dan Stacy of Grand Rapids was unable to be present and Ray L. Barton presided in his stead.

Following the dinner Mr. Barton asked the delegation to stand in silence for a minute as a token of respect to Mr. Redmonds memory. Homer E. Stafford delivered a brief eulogy which was very impressive. The program which followed was a sound film from the Calco Chemical Corporation, furnished through the courtesy of the Heller & Merz Company through their representative L. L. Griffith. The film showed in detail the manufacturing processes in color making and was both interesting and instructive.

The second part of the program was an address by W. R. Willetts of the Titanium Pigment Company. Mr. Willetts is no stranger to the members of the Michigan Division and his talk and the forum which followed was thoroughly appreciated.

The Beloit Iron Works will furnish the program for the March meeting and the date for the annual ladies night was definitely announced for Saturday night April the 30. Among those in attendance were H. D. Frost, Sinclair Company; W. R. Willetts and A. A. Coffin of the Titanium Pigment Corporation; L. L. Griffith, Heller & Merz; R. L. Zellers, French Paper Company; O. F. Fisher, Bryant Paper Company; Barney Benson, Williams & Gray Company; R. L. Barton, C. A. Braginton, W. H. Astle, G. C. Schmid and M. S. Fogerty, Michigan Paper Company; O. W. Callighan, Edgar Brothers; A. W. Cole, H. C. Bradford and Heine Nendorf, Rex Paper Company; Jacob Parent, Noble & Wood Machine Company; H. E. Stafford and Care C. Schneider, Hawthorne Paper Company; Arnold Weller, Glen Sutton, Al Sherwood and K. T. Pederson, Sutherland Paper Company; L. H. Breyfogle, Draper Brothers Company; J. G. Wright and L. C. Stoutjesdijk, A. M. Meincke & Son, Inc.; H. B. Johnston, Allied Paper Company; C. F. Simmerer, L. P. Hill, B. Richards, W. S. Huss and J. C. Marrone, Acme Steel Company; L. E. Fitzgerald, Hercules Powder Company; F. B. Eilers, Orr Felt & Blanket Company; C. B. Smith, Huron Milling Company; W. B. Hadley, Detroit Paper Products Corporation; C. F. Sisson, MacSim Bar Paper Company; James A. Wise, Kalamazoo Paper Company; F. G. Crane, L. H. LaLiberte, R. B. Stewart, Marshall Rutz and Al Perlick, Kalamazoo Vegetable Parchment Company; H. E. Stratton, PAPER TRADE JOURNAL.

Arthur Huggins Addresses Papermakers

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., February 21, 1938.—A meeting of several locals affiliated with the International Paper Company and International Brotherhood of Pulp, Sulphite and Paper Mill Workers, was held here last week at which addresses were given by Arthur Huggins, secretary of the International organization, and other labor officials. In addressing the Northern New York District Council, Mr. Huggins dwelt on the comparative labor situation of this country and Canada. He pointed out that newsprint was the lowest grade of paper marketed today and that wages paid for the manufacture of all kinds of paper depend directly upon the current price newsprint brings. He said the outlook in the paper industry all depends on maintaining the price of newsprint as it will help these other grades of paper which are regulated by the newsprint price. He said that he believed that the price would be maintained and business would pick up. He reminded the group that kraft manufacturers report a very promising outlook for 1938 and expect business to pick up by March and equal or better 1937 business. He pointed out that although business has declined, nevertheless, through close cooperation of union workers and officers the companies are well satisfied and have in many instances been benefitted both financially and in improved labor conditions. Speaking of the council, he said that this newly formed labor body is one of six such groups in existence today. Others are in the Niagara Falls section, the Michigan-Wisconsin district, two west coast sections and the Ottawa district.

Frederick W. Hoefler Dead

Frederick W. Hoefler, 58, president of the Oswego River Paper company, died Tuesday February 15 at his home on Fulton street, Phoenix, N. Y., after an illness of several weeks.

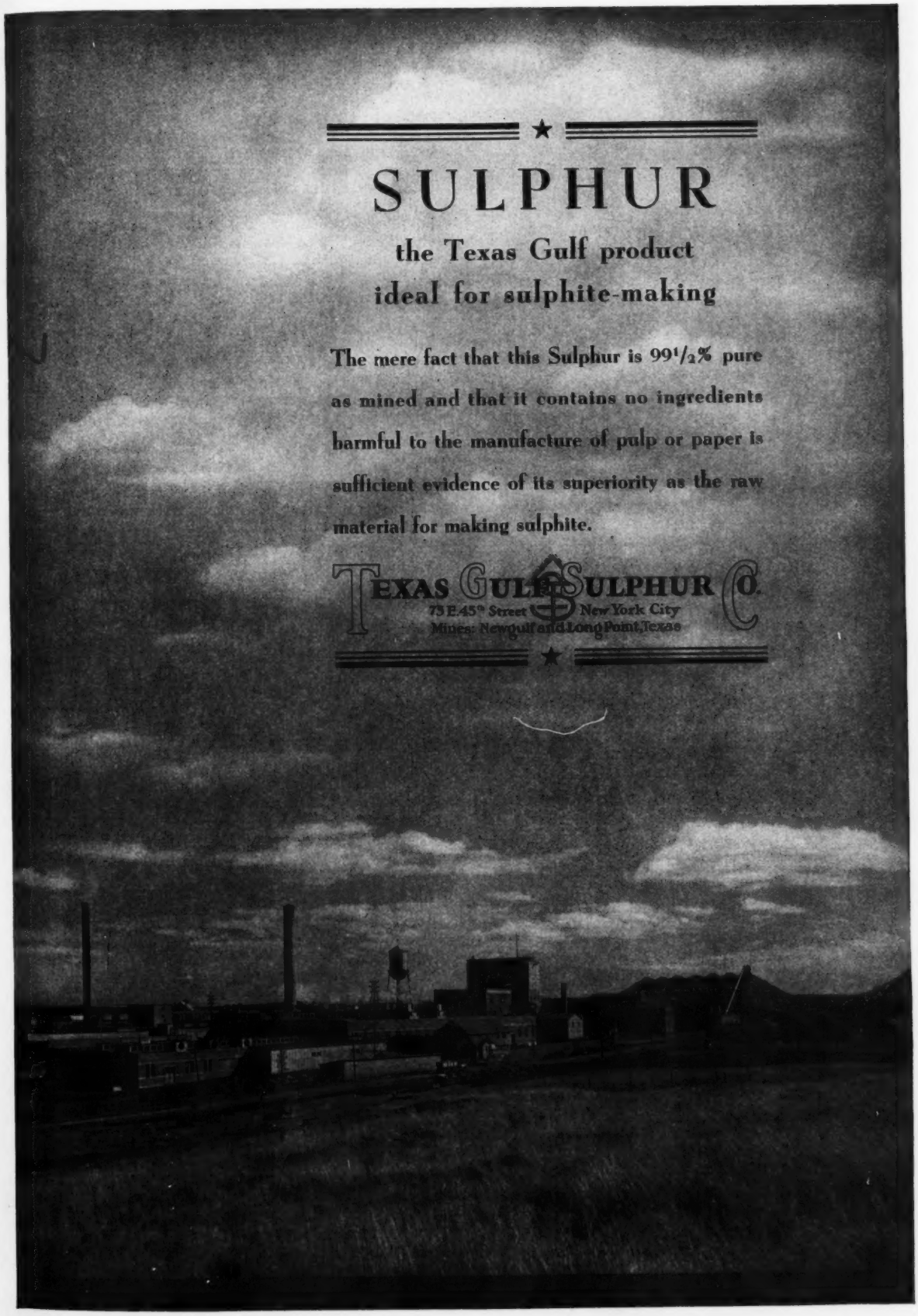
Mr. Hoefler is survived by his widow, Mrs. Ethol Eckler Hoefler, one daughter, Mrs. Virginia Betts of Syracuse, two grandchildren, George Ira and Valerie Betts; one son, Frederick W. Hoefler, Jr., a student in Mercersburg Academy, Pa.; two brothers, Edward and Jack Hoefler, of Ilion; four sisters, the Misses Anna and Tillie Hoefler, Mrs. Walter C. Rix and Mrs. A. S. Ross, all of Ilion.

Besides being president of the Oswego River Paper Company, Mr. Hoefler was vice-president of the Phoenix Bank. He was a member of Callamachus lodge, F. and A. M., and Oswego River chapter R. A. M. He was also a member of the Phoenix Rod and Gun club and served at the present time as its treasurer.

He was formerly a member of the village water board and of the board of education. He was a member of St. John's Episcopal church and a vestryman.

Finch, Pruyn & Co. To Add Grinders

GLENS FALLS. N. Y., February 21, 1938.—Improvements are planned for the groundwood mill of Finch, Pruyn & Co., which include the installation of two additional modern grinders to replace several old-fashioned machines. A contract for the new equipment has been placed with the Montague Machine Company, of Turner Falls, Mass., and the installation is expected to be completed early in the spring. Eight grinders were installed in the mill in 1934 replacing twenty-three of the old kind and the new equipment to be installed is also of the modern brand. While installation of new grinders will not cause any reduction in the working force it will enable the company to make a better grade of pulp at a lesser cost because of increased efficiency.


SULPHUR
the Texas Gulf product
ideal for sulphite-making
The mere fact that this Sulphur is 99½% pure as mined and that it contains no ingredients harmful to the manufacture of pulp or paper is sufficient evidence of its superiority as the raw material for making sulphite.
TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Newgulf and Long Point, Texas

General Electric Co. Works Laboratory

George H. Harnden of the Works Laboratory of the General Electric Company of Schenectady, N. Y., aroused the interest of the gumming industry by the installation of an automatic McLaurin tester for measurement of adhesive values of sealing tape.

This machine is equipped with timing and tripping device, time switch, timer, solenoid trip and main line switch, largely eliminating objectionable features of manual operation. Actual tests were run daily at the exhibit for benefit of paper merchants.

Mr. Harnden, representing General Electric Company, has long been an exponent of product standards as now being projected by the Certified Products Bureau, Division of the Gummed Industries Association. The installation of this machine is seen as an endorsement of the objectives of the Certified Products Bureau.

Ross A. Fife, Managing Director of the Certified Products Bureau, visualizes, through this exhibit, colorful posters and industrial equipment, the "sweeping" plans for projecting Industry Product Standards for Gummed Sealing Tape. Mr. Fife points out that the sale of sub-standard sealing tape resulted in the organization of the Bureau for certification of industry product standards. Manual of Regulations and first industry specifications for gummed sealing tape will be released shortly.

Blotting Paper Association

At the general meeting of Blotting Paper Manufacturers Association held on Tuesday, February 22, at the Waldorf-Astoria, the members' chief interest concerned the blotting paper section contained in the reciprocal trade agreement with Great Britain. The Association decided that it will file a protest with the State department.

The following were elected: President, Wilbur W. Langtry, District of Columbia Paper Mills; vice-president, Henry S. Mead, Wrenn Paper Company; secretary-treasurer, James L. Ritchie.

Bristol Board Manufacturers Group

The general meeting of the Bristol Board Manufacturers Group was held on Monday, February 21, at the Waldorf-Astoria, at which meeting the following officers were elected: Chairman, R. I. Worrell, Wheelwright Paper Company; and vice-chairman, James Ramage, Franklin Paper Company. James L. Ritchie is secretary.

On the executive committee are Norman Harrower, Linton Brothers; Rolf Westad, Waterfalls Paper Company; James Rylands, Standard Paper Manufacturing Company; and Joseph Holmes, Chemical Paper Company.

Groundwood Paper Association

At the annual meeting of the Groundwood Paper Manufacturers Association at the Waldorf-Astoria, Tuesday, February 22, the following officers and members of the Board of Governors were elected:

President, J. H. Coy, Flambeau Paper Company; Eastern vice-president, W. C. Shorter, International Paper Company, New York; Western vice-president, R. O. Warner, Minnesota and Ontario Paper Company. Board of Governors include the above and the following: East, Tom Farwell; West, George H. Fay.

Savannah Reunion of TAPPI

A reunion of the technical men who attended the TAPPI Convention last October at Savannah, Ga., was held in the Casino-in-the-Air of the Belmont Plaza, New York, Tuesday evening, February 22. The wives and friends of the members, about three hundred in all, gathered in the casino for refreshments and the singing of old time songs. D. G. Moon, of the Union Bag and Paper Corporation, Savannah, Ga., assumed the role of a Walter Winchell and told little stories about many of the members present, adding much to the merriment of the dinner-dance. The dancing ended in the small hours of the morning, after a most successful reunion.

M. A. Hofft to Install Bark Burners

M. A. Hofft, president of the M. A. Hofft Company, 441 West Georgia street, Indianapolis, Ind., writes as follows:

I notice a report in the February 17th issue of the PAPER TRADE JOURNAL, that the Lake Sulphite Company has awarded a contract to the Port Arthur Shipbuilding Company for the installation of bark burners.

I wish to advise you that we have the contract for these bark burners and the feeding equipment, and that we are having this material built in the plant of the Port Arthur Shipbuilding Company on our patents.

Next Paper and Twine Club Meeting

In an interview with the PAPER TRADE JOURNAL, J. L. Richey, secretary-treasurer of the Paper and Twine Club, said that the annual meeting will be held on Monday and Tuesday, June 6 and 7, 1938, at the Spink Wawasee Hotel, Lake Wawasee, Ind. Officers will be elected at that time.

The activities of the coming session will be divided into three groups. The mornings will consist of the presentation of merchants' and manufacturers' relations in merchandising. Golf tournaments will take place in the afternoons.

Names Trustee for Sherman Paper Co.

The Sherman Paper Company, which operates three pulp and paper mills in northern New York, has been adjudged a bankrupt by Federal Judge Frederick H. Bryant.

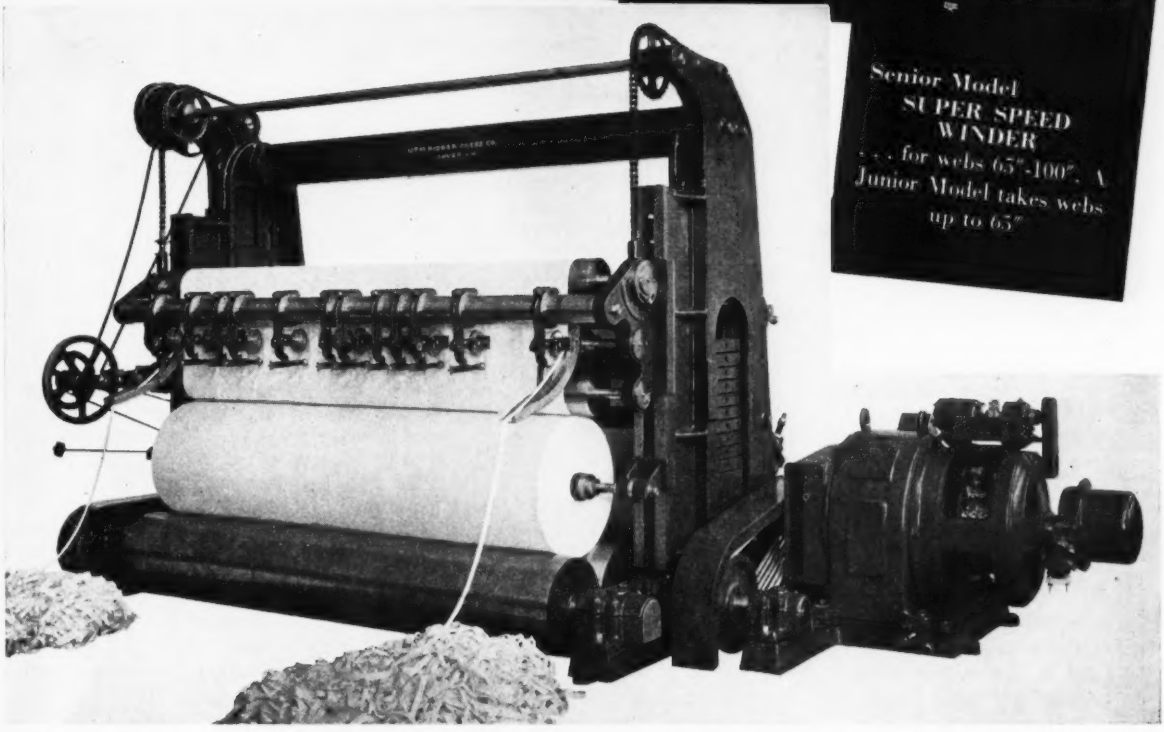
At the hearing last week Judge Bryant named C. Palmer Barnes, treasurer of the concern for thirty-five years, temporary receiver and announced that liquidation would begin immediately.

Mr. Barnes listed assets at $60,000 and major liabilities of property taxes, $43,000; mortgage indebtedness, 185,000 and unsecured debts $475,000.

American Waxed Paper Association

At the Waldorf-Astoria on Monday, February 21, the American Waxed Paper Association held its election of officers. George J. Lincoln, Jr., was re-elected executive secretary and the following were elected to the board of governors for a term of two years:—J. E. Edelstein, Rap-In-Wax Paper Company; A. Schwab, Hamersley Manufacturing Company, Inc.; Robert Fairburn, Berst-Forster-Dixfield Company; and Howard Larsen, Crystal Tissue Company.

this SUPER SPEED SHEAR-CUT SLITTER and ROLL WINDER saves hours . . . improves work . . . saves dollars



Senior Model SUPER SPEED WINDER . . . for webs 65"-100". A Junior Model takes webs up to 65"

At 2,000 feet per minute, this winder hums. Its shear cutters *cut* the web, with not a sign of ragged edges. Its rolls wind straight and true, no trace of interweaving . . . falling apart of their own accord. Its operator shifts for uniform, accurate cutter widths with maximum speed. It is engineered for simplified operation, and built massively and rigidly for high speeds and length of life.

Developed by Kidder Engineers both here and in Great Britain, this rewinder can be a source of real savings to you in time, work spoilage and money.

A type and size available for paper machine end, finishing room and converting plant.

A new bulletin fully describes its construction and operation. Send for it.

Or, if a rewinding problem bothers you, jot down the character of product, size of roll, and rewind widths, and your power facilities, and

Send it to KIDDER

OUR ANSWER MAY BE A PROFIT TO YOU

U.P.M. TRIPLE POINT PRESS KIDDER

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CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Newark, N. J.—The Vanity Products Corporation, 401 High street, manufacturer of paper and cardboard boxes for the drug industry, toilet articles, jewelry and kindred purpose, has arranged for lease of space in building at 392-302 Jelliff avenue, totaling about 13,000 square feet of floor area, and will equip and occupy for new plant. Present works will be removed to new location and additional facilities installed for increased output. Employment will be given to about 50 persons.

Port St. Joe, Fla.—St. Joe Paper Company, now constructing a local mill, has awarded a contract to the North Electric Manufacturing Company for the installation of a complete inter-communicating automatic dial telephone system in all important divisions of new plant. Work will be placed under way at early date.

Green Bay, Wis.—The Northern Paper Mills, manufacturer of tissue and other paper stocks, have plans maturing for new steam power plant at mill, recently referred to in these columns, and will take bids on general erection contract at early date; also for power station stack and various mill equipment; specifications are being completed for feed-water heater installation. New plant will cost about $750,000, with equipment. Sargent & Lundy, Inc., 104 South Dearborn street, Chicago, Ill., is consulting engineer.

New York, N. Y.—S. Rappaport, Inc., 516-22 West 34th street, manufacturer of paper boxes and containers, has leased additional space in building now occupied, address noted, and will occupy for expansion.

Williamsport, Pa.—A portion of the former local plant of the United States Sandpaper Company, Inc., has been acquired by the Williamsport Textile Company, and will be used by purchasing company for expansion.

Niles, Ohio—The National Gypsum Company, manufacturer of wall board, insulating board and allied specialties, will begin superstructure soon for new addition to local mill, previously referred to in these columns, to be used for expansion in storage and distributing departments. It will be one-story, estimated to cost about $40,000, including one-story train shed adjoining. Keich & O'Brien, Union Savings & Bank Building, Warren, Ohio, are architects. Main offices of company are at 190 Delaware avenue, Buffalo, N. Y.

Cleveland, Ohio—The Container Corporation of America, Inc., 3455 Vega avenue, Cleveland, manufacturer of corrugated and other paper boxes and containers, folding paper boxes, etc., has arranged for lease of portion of former plant of the Stearns Motor Car Company, Euclid avenue and Lakeview road, now held by the American Industrial Buildings, Inc., totaling about 65,000 square feet of floor space, and will remodel and equip for new plant. Paul Matzinger, Empire Building, Cleveland, is architect for work, and general improvement contract has been awarded to the Harris Construction Company, Hippodrome Building. The leased space, in Building No. 3 will be supplemented by additional floor area in the future; the company has taken an option for 35,000 square feet of further space before the end of its first 24 months of occupancy, with an additional 35,000 square feet by the end of the fifth year, making a total plant area of 135,000 square feet. Facilities will be installed for employment of about 100 men for initial production, scheduled to begin at early date. This will be developed as main Cleveland plant of company and operations concentrated at such point in the future. Main offices of company are at 111 West Washington street, Chicago, Ill.

East Providence, R. I.—Green Brothers Company, Inc., 35 Valley street, manufacturer of paper boxes and containers, is completing work on new two-story and basement plant addition, 38 x 80 feet, previously referred to in these columns, and will proceed with equipment installation in near future. It is reported to cost approximately $50,000, with equipment. The Dwight Seabury Company, 188 Main street, Pawtucket, R. I., is architect and engineer.

Cincinnati, Ohio—Following recent purchase of the mill of the Container Corporation of America, Inc., at 5500 Eastern avenue, Cincinnati, as noted in these columns, the Southern Kraft Corporation, 220 East Forty-second street, New York, N. Y., is said to have plans under consideration for new one-story addition, reported to cost over $80,000, including equipment. Details of unit will be determined at early date.

Abitibi Earns $114,219 in January

Earnings of the Abitibi Power and Paper Company, Ltd., for January were $114,219, after expenses but before depreciation, interest and income taxes, against $280,822 in December and $336,972 in January last year, according to J. T. Clarkson, receiver and manager.

Mr. Clarkson said shipments of newsprint in January were 18,058 tons, against 46,772 in December and 35,545 tons in January, 1937, with present indications that the volume in February will be about the same as in January.

Guaranteed Label Protects Jobbers

Distributors, jobbers and consumers of wrapping tissue are given valuable protection as to quality, size and count of wrapping tissue in the guaranteed label now appearing on standard bundles of this important product.

The label, reproduced here is owned, copyrighted

and issued by The Wrapping Tissue Association. The label guarantees grade, color, count and size and is an important step forward in the merchandising of this product.

Most interesting part of the plan is the policing of the label by the association. Bundles of wrapping tissue are purchased by the association from jobbers' stocks, are checked for size, and count, and then submitted to the Institute of Paper Chemistry for analysis. Should analysis prove that the tested tissue does not conform to the label guarantee, the label is withdrawn from the manufacturer.

Each step in the program has been carefully worked out. The label is copyrighted and owned by the association. It is printed on special paper designed to make counterfeiting readily detectable. And the testing of tissue is carried on regularly and frequently.

There is being prepared at the present time a "Buyer's Guide" for wrapping tissue. It will include full explanation of the guaranteed label, trade customs of the industry, and pertinent hints and advice for the buyer of wrapping tissue. When published, the "Buyer's Guide" will be available to jobbers, distributors and consumers, without charge. Requests for the "Guide" should be addressed to The Wrapping Tissue Association, 19 West 44th street, New York City. Plans are also under way to provide a testing service for jobbers and consumers. If plans succeed, jobbers and consumers may submit wrapping tissue to the association for laboratory test as to quality. Further announcement as to this phase of the program will be made at a later date.

The following companies are now using the guaranteed wrapping tissue label—

Adams Paper Company, American Tissue Mills, California Fruit Wrapping Mills, Consolidated Water Power and Paper Company, Crown Willamette Paper Company, Crystal Tissue Company, Detroit Sulphite Pulp and Paper Company, Dunn Sulphite Paper Company, Diamond Mills Paper Company,Flower City Tissue Mills, Little Falls Paper Company, McIntyre Brothers Paper Company, North End Paper Company, Northern Paper Mills, Peavey Paper Products Company, Port Huron Sulphite and Paper Company, Southern Kraft Corporation, Stevens & Thompson Paper Company, Three Rivers Paper Company.

To Expropriate Two Quebec Pulp Mills

The Quebec Government has decided to expropriate the two groundwood mills of the Quebec Pulp and Paper Corporation at Chicoutimi. These mills which have been idle for some years have a capacity of 600,000 lbs. of dry ground wood pulp per day. Premier Duplessis, in introducing a measure in the Provincial Legislature empowering the Government to expropriate the mills, explained that last year a measure was adopted that enabled the Government to expropriate the property of the insolvent Quebec Pulp and Paper Corporation, so as to assure the reopening of the Chicoutimi mills and work for hundreds of men.

It was later found out that the measure did not enable the Government to expropriate the mills, but only the forest limits belonging to the company. Under the amended measure the Government will be enabled to expropriate the mills and also purchase shares of the Quebec Pulp Company now in circulation.

Mr. Duplessis announced that he had induced the Consolidated Paper Company and the Price Brothers Company to remit to the Government $2,400,000 worth of common shares of the Quebec Pulp and Paper Corporation in their possession. Apart from this, he said, there is $7,000,000 worth of preferred stock of a nominal value in circulation. Because of the planned reopening of the mills, speculators had tried to boost the value of these shares to over $5 each, though previously their price had been 17 cents. This speculation the Government would not tolerate, he warned.

The bill was passed by the House.

Buys More Land Near Mobile

Hollingsworth & Whitney Company, Boston, Mass., has acquired an additional 222 acres of land in the Magazine Point sector, Mobile, Ala., preparatory to construction of a huge new pulp and paper mill, estimated to cost $5,000,000.

A warranty deed on file in probate court revealed that James H. Wilson had sold a 222-acre tract, fronting on Chickasabogue, to the paper company. The property is in section 37 of the Diego Alvarez claim. The purchase price was not announced.

The Boston concern early in October of last year took a 60-year lease on a tract of land in Magazine Point, located on the northern edge of the city, and bought 33 houses on the property of its owner, Mrs. Helen R. Meaher.

The deal, court records show, involved $401,000 in purchase and rentals.

Since then the company has bought outright several small parcels of ground in that section. Samuel D. Deforest, an official of the company, has had offices in Mobile for several months, preparing for construction of the plant which is expected to give work to 1,000 to 2,000 persons.

Goes With Ashland Paper Mill

Alfred Corman, formerly with the Park Tissue Mills, has been made vice-president and sales manager of the Ashland Paper Mill, Inc. The plant of the Ashland Paper Mill, Inc., is situated at Ashland, N. H., and its main office, 139 Plymouth street, Brooklyn, N. Y.

PAPER TRADE JOURNAL
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THE YEAR IN PAPER

Total production of all grades of paper broke all records in 1937 and established a new high output estimated at 12,600,000 tons, which was 625,000 tons larger than 1936 and 1,460,765 tons greater than 1929. Gains were recorded in writing, cover, book, newsprint, tissue, building and miscellaneous papers, with the greatest increase in paperboard.

Production of the entire paper industry for the year averaged 85 per cent of capacity. For the first five months of 1937, the industry as a whole operated at over 90 per cent of capacity, in contrast to the drastic decline in the fourth quarter when the operating ratio for the whole industry dropped in December to 55 per cent of capacity.

The high production of newsprint in 1937 was an outstanding performance in the paper industry. Production in Canada for the year totaled 3,645,309 tons, compared to 3,179,914 tons in 1936, or a gain of 14.3 per cent. The year started with an increase of 26.4 per cent in January 1937, and while there was a decline to 1.3 per cent over 1936 in December 1937, the total output for the year was a notable one. As competent engineers have estimated the maximum production of all Canadian mills in 1937 did not exceed 3,700,000 tons, the actual production for the year was even higher than the practicable capacity. The price situation was satisfactory at the prevailing price of $42.50 per ton. This was increased to $48 per ton by the Great Northern Paper Company for the first half and to $50 per ton for the second half of 1938. The announced price of the International Paper Company was $50 per ton for the first and second halves of 1938. Exports of Canadian newsprint totaled 3,455,000 tons, a gain of 15 per cent in 1937. Shipments to the United States were 2,899,000 tons, or 500,000 tons greater than 1936, which was a gain of 21 per cent. Overseas shipments from Canada totaled 556,000 tons, a decrease of 38,000 tons or 6 per cent in 1937.

Imports of newsprint into the United States from all sources totaled 3,317,000 tons in 1937, an increase of 565,000 tons or 21 per cent. Canada furnished 88 per cent of this tonnage, Europe 9 per cent and Newfoundland 3 per cent.

Book paper production for 1937, estimated at 1,525,000 tons of uncoated paper, operated at an average production ratio of 81 per cent of capacity, which compared with a production of 1,436,046 tons in 1936 and 1,497,912 tons in 1929. The production of both coated and uncoated book papers for the year was 8 per cent larger than in 1936. Production paralleled orders, with the normal seasonal variations, resulting in peak orders in March and September and seasonal low points in July and October. The decline between August and December, during the business recession, was approximately 28 per cent. The upward trend in book paper prices which began at the close of 1936 continued and the average price for book paper in 1937 was approximately 85 per cent of the 1929 price.

Writing paper production, estimated at 616,000 tons in 1937, was 8,410 tons larger than in 1929 and just high enough to set up a new high production record. The industry operated at 84 per cent of capacity, compared with operating ratios of 84 in 1936 and 71 per cent in 1935. No additional machines were installed but the industry is constantly faced in depressed times with the possibilities of the shifting of machine capacity from other fields.

The demand for kraft paper was of unprecedented volume in the first half of 1937, with the largest number of unfilled orders on record. Production facilities were operated at capacity for many months. At the beginning of the second half of the year, conditions gradually changed and the kraft industry passed from a high rate of activity to relative stagnation. During the first quarter of 1937, manufacturers were handicapped by lack of reserve capacity to handle the peak demand. New mills, which came into production about the middle of last year, are now in full production and the capacity is able to meet any probable peak requirements in the future. Expectations for 1938 are for a relatively low production for the first quarter of the current year and a gradual improvement throughout the year.

The paperboard industry established a new all time high record in 1937 with an estimated production of 5,500,000 tons, which surpassed 1936 by nearly 5 per cent. In the past, seasonal variations resulted in increases in the Spring and Fall and corresponding declines in Summer and Winter. The year 1937, like 1933, failed to conform to the usual trends, due to

general business conditions in the earlier year and to the recession last Fall. The increase in tonnage of container grades has been the major factor in the expansion of the industry in the last three years, largely due to the inclusion of new uses of paperboard shipping containers. With mill activity averaging 84 per cent in the first half of 1937, with orders calling for over 12 days of running, a saving was made which partly offset rising material costs. The reverse was true in the second half of the year, with operations down to 63 per cent and orders below 6 days to run. Prices which began to advance at the close of 1936 continued during the first quarter of 1937, influenced by higher labor and material costs. The top was reached in April and May. At the close of the year prices were below the January levels, but during the decline no sharp breaks occurred such as have been present in losses of volume in the past. Expectations for 1938 are for less volume in the first half of the year with the last half well in excess of 1937.

Notable progress was made in the production and distribution of wood pulp in the past year. The total domestic production of wood pulp in 1937 totaled 6,664,100 tons, compared to 5,695,219 tons in the preceding year. Imports of all grades of pulp amounted to 2,394,539 tons, compared to 2,177,500 tons in 1936. The great expansion in the manufacture of wood pulp were in new mills erected in the South and great interest is centered in the present development of improved methods for the utilization of southern pine in the manufacture of pulp.

Soundview Pulp Co. Beats 1937 Record

Tending to justify predictions of another active year for Western Washington Pulp Mills, the Soundview Pulp Company states that its January business substantially exceeded that during January, 1937.

Company officials report that production last month totaled 9,207 tons of pulp; sales, 6,944 tons, and that net profit ran up to $72,960.

Coincident with this announcement, 482,792 shares of the no par common stock of the Puget Sound Pulp & Timber Company, with mills at Bellingham and Anacortes, was being admitted to listing on the San Francisco Stock Exchange. This was to be traded in units of 100 shares.

Trading on that exchange already is active on shares of Rayonier, Inc., formed several months ago through a merger of the Rainier Pulp and Paper Company of Shelton, Grays Harbor Pulp and Paper Company, Hoquiam, and the Olympic Forest Products Company of Port Angeles.

Japan Agrees on Pulp Imports

The Japanese Ministry of Commerce and Finance has agreed on the following wood pulp imports of 1937 unfilled contracts to be distributed throughout the months of January, February, March and April as follows: January, 15,210 tons; February, 21,681 tons; March, 12,580 tons; and April, 8,552 tons.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES

Months	1938(c)	1937(c)	1936	1935	1934
January	63.8%	90.3%	76.1%	65.8%	.....
February	.....	90.1%	77.9%	70.0%	.....
March	.....	90.3%	76.0%	70.5%	.....
April	.....	92.1%	82.3%	70.0%	.....
May	.....	90.6%	81.6%	69.4%	.....
June	.....	87.3%	80.7%	72.3%	.....
July	.....	81.8%	77.3%	64.9%	.....
August	.....	82.9%	81.5%	70.9%	.....
September	.....	78.6%	80.5%	71.9%	58.2%
October	.....	73.5%	87.6%	75.6%	64.7%
November	.....	61.9%	88.0%	75.3%	61.7%
December	.....	54.5%	85.9%	71.2%	59.6%
Year Average	.....	80.6%	81.3%	70.5%	.....
Year to Date					
First 6 weeks	64.5%	89.9%	76.5%	66.4%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1938		CORRESPONDING WEEKS, 1937	
*January 8	59.2%	January 9	92.1%
*January 15	62.3%	January 16	90.2%
*January 22	66.0%	January 23	88.9%
*January 29	67.9%	January 30	90.1%
*February 5	66.1%	February 6	88.1%
*February 12	66.7%	February 13	90.2%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks					
Ratio Limits	Jan. 8, 1938	Jan. 15, 1938	Jan. 22, 1938	Jan. 29, 1938	Feb. 5, 1938	Feb. 12, 1938
0% to 50%	140	127	116	108	107	79
51% to 100%	175	187	197	200	194	142
Total Mills Reporting	315	314	313	308	301	221

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported by individual companies.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

Mos.	1937(e)	1936	1935	1934	Mos.	1937(e)	1936	1935	1934
Jan.	80%	61%	61%	....	July	67%	69%	59%	....
Feb.	86%	67%	67%	....	Aug.	74%	75%	65%	....
Mar.	87%	68%	67%	....	Sept.	70%	76%	69%	62%
Apr.	89%	70%	61%	....	Oct.	66%	82%	76%	63%
May	86%	68%	61%	....	Nov.	56%	79%	70%	56%
June	75%	68%	65%	....	Dec.	46%	74%	60%	52%

Week end. Jan. 8, 1938—45%
Week end. Jan. 15, 1938—52%
Week end. Jan. 22, 1938—58%
Week end. Jan. 29, 1938—60%
Week end. Feb. 5, 1938—59%
Week end. Feb. 12, 1938—60%

(e) Basic figures revised to include new members of the National Paperboard Assn.

Chilean Imports of Newsprint Rise

Chilean imports of newsprint increased from 11,042 metric tons in 1936 to 14,795 metric tons in 1937, according to a report to the Department of Commerce from the office of the American Commercial Attache, Santiago.

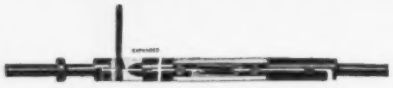
Production of newsprint, however, showed little change in 1937 amounting to only 1,175 tons, or approximately the same as in 1936, the report stated.

Production of newsprint in Chile is not expected to increase until the completion of a new mill at Puente Alto, which will have an estimated capacity of between 10,000 and 12,000 tons per year. The present program calls for only 6,000 tons yearly, it was reported.

Canada was the chief source of supply for Chilean newsprint imports during 1937, having furnished 21,067,200 gross pounds, while Germany furnished 6,734,200 gross pounds, statistics show. The United States ranked third, supplying 2,772,000 gross pounds during 1937, according to the report.

MURRAY

WOOD ROOM AND PAPER MILL ....EQUIPMENT



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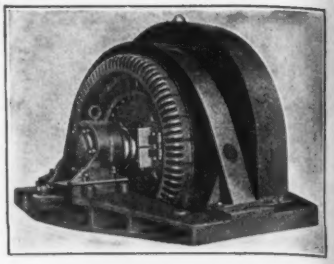
Backed by a plant and organization that for over half a century have been building heavy and special machinery —always keeping pace with changes in the industry and developing new machines to meet those changes. Our engineering services are always available to help you solve your mill problems.



PULPWOOD CHIPPER
Murray Pulpwood Chippers produce better chips, save power and space. Less sawdust and no vibration. Direct-connected to synchronous motors; or belted, as desired.

BARKING DRUMS
Not a rivet in their construction, Murray-Branch Barking Drums are designed to lower maintenance costs—all parts accurately machined so the drum is a perfect cylinder.

D.J.Murray Mfg. Co.

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